THE RUBBER AGE

ESTABLISHED 1917

COVERS ALL PHASES OF THE PRODUCTION AND MARKETING OF CRUDE RUBBER AND THE MANUFACTURE AND DISTRIBUTION OF RUBBER GOODS

Vol. 43 MAY, 1938 No. 2

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THE RUBBER AGE, published on the 15th of each month by the Palmerton Publishing Company, Inc., at East Stroudsburg, Pa. Editorial and Advertising offices at 250 West 57th Street, New York City. Established 1917.

Entered as Second Class Matter, October 20, 1933, at the Post Office at East Stroudsburg, Pa., under Act of March 3, 1879.

Subscription Rates: Domestic, $2.00 a year; Canada, $2.50; Foreign, $3.00. Single copies, up to 3 months old, 25 cents; over 3 months old, 50 cents.

Telephone COlumbus 5-2923, 5-2924

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The Rubber Age

Published Monthly at East Stroudsburg, Pa.
Editorial and Advertising Offices: 250 W. 57th St., New York

Vol. 43 MAY, 1938 No. 2

Preventing Mildew Growth in Finished Rubber Products

Use of Antiseptics in Small Amounts Has Been Found Successful for Inhibiting or Destroying Mildew Growth

By R. V. Yohe
Manager, General Chemical Labs., B. F. Goodrich Co.

EVERY housewife knows that if a cotton or linen cloth, an old shoe, or some types of food scraps are allowed to lie in a damp, dark cellar, mildew will appear on them, and a disagreeable odor will emanate from the mildewed article. The average housewife also knows that if a mildewed article is placed in a dry, sunlit room, or outdoors in the sunlight, the mildew growth will disappear entirely, although a stain may remain. Only recently, through the medium of advertising, the "discovery" of mildew of rubber articles and fabrics was made known to the public. In effect this served to call the attention of the layman to an age-old problem which has confronted rubber manufacturers for years, and which has been studied to some extent by most of them.

The liability of cotton and linen fabrics to mildew in a warm, humid atmosphere, and particularly in the absence of sunlight, finds no exception in rubber articles that are partially composed of fabrics or cord. Even rubber itself will show evidence of mildew under certain conditions. Mold growth on unvulcanized rubber or on rubber shoes left in damp, dark basements or storage rooms is rather common. Cotton jackets of fire hose, if not thoroughly dried, may show extreme mildew growth during storage or even after use and during storage in fire stations. Conveyor belts used in mines and grain elevators may show mildew growth on fabric plies if the belt covers are ruptured or stripped off.

The problem, then, which has faced the manufacturer of tennis shoes, rubber coated fabric belts, conveyor belts, fire hose, etc., is that of so preparing the rubber article that the deleterious effect of mildew will be kept at a minimum. So far as is now known, mildew on vulcanized rubber causes little harm, although extensive mildew growth over a long period of time on crude or unvulcanized rubber may very definitely injure it.

It is a well-known and definitely proved fact that mildew growth on cotton and linen fabrics causes loss in strength and eventually causes complete deterioration of these fabrics. This has been pointed out in the published works of the British Cotton Industry Research Association on the subject, articles by research

men in the United States Bureau of Agriculture, and in reports in the files of large industrial organizations which are concerned with the problem.

All cotton goods are infected with mildew, since spores are continually being deposited in them. These spores are at all times present in the air. Raw cotton particularly contains a heavy infection and some of this may be traced directly to the plant itself and to diseases of the boll. These contaminating spores are extremely resistant to destruction by heat even at vulcanizing temperatures. The fabric from a piece of rubber covered belting vulcanized for 30 minutes at 285°F. will show mildew growth within two weeks after heating if kept under proper conditions of humidity and temperatures, even in a sterile atmosphere.

Prevention of Growth Important

Infection of cotton fabrics and cords cannot be avoided, hence the prevention of further growth becomes the important factor. It is a well-known fact that if the moisture content of cotton fabrics is kept below a certain per cent (8.0-8.5%) the ordinary mildew fungus will not grow. It is also known that relatively inert atmospheres containing about 80% carbon dioxide will completely inhibit growth. Such conditions of humidity or atmosphere are generally difficult to establish or maintain. Since the presence of many antiseptics in small amount will completely inhibit or destroy mildew growth, most of the recent work on the subject has dealt with the preparation and use of antiseptics which will serve the desired purpose as determined by the final service the treated fabrics must meet.

Aspergillus and *Penicillium* are the prevalent types of mildew fungi found in nature on cotton. *Chaetomium globosum* is usually found where mildew on linen is reported. These, however, do not by any means include all of the various types which may occur. For instance, in the freshly vulcanized belt mentioned above, the following were found along with the more common types, *i.e., Mucor hiemalis, Penicillium glaucum. Rhizophus nigricans, Pachybasium* and some mold belonging to the *Monilia* group. These various species differ in their ability to withstand the destructive effects of the many antiseptics tested. It is also known that *Penicillium* will grow at lower temperatures than the *Aspergillus* species and hence will be more common than the latter in temperate climates.

Zinc chloride, inorganic fluorides, rare earth salts, organo-mercury compounds, phenols, cresols, and other organic substances, which are antiseptics, are inhibitors of mildew growth. As intimated above, the choice of a proper inhibitor is not simple, since the various mildew fungi react differently to various inhibitors. *Aspergillus flavus* is probably the most resistant of all the species. *Penicillium* types are very resistant to organo-mercury compounds. *Cladosporium* resists the rare earth salt inhibitors to a marked degree.

The choice of a proper mildew inhibitor for use in the rubber industry is even more complicated. Since protection may be obtained either by incorporating the antiseptic into a rubber compound which will contact the fabric to be protected (protection is obtained by bleeding of the material from the rubber into the fabric), or by impregnating the fabric, with subsequent drying, with a solution containing the inhibitor, it is very important that the inhibiting chemical meet the following conditions:

1. It must not be water soluble. In fire hose jackets, for instance, a water soluble mildew inhibitor would lose is value very rapidly when the hose became wet.
2. It must not vaporize readily.
3. It must not have a strong or disagreeable odor.
4. It must be reasonably inexpensive.
5. For most service it should not discolor fabric under any condition or otherwise show any chemical reaction with it.
6. It must not activate or retard vulcanization of rubber compounds or affect them in any other way.
7. It must not be deleteriously affected by heat, water, steam, cold, or by any of the usual compounding ingredients for rubber.
8. It should be particularly active against those types of mildew which would be most likely to appear under the service conditions of the rubber article. For economy, however, an all-service mildew inhibitor is most desirable.

It should be stated that one of the more effective means of preventing mildew growth in rubber goods is an integral covering of vulcanized rubber over the fabric. The cotton in garden hose, for example, will not mildew so long as the tube or cover is not ruptured so as to expose the fabric to air. As stated earlier in this article, there is little evidence that mildew seriously deteriorates vulcanized rubber over long periods of time. This is particularly true when that rubber is in service. Since air and moisture penetrate vulcanized rubber only slowly at best and in relatively small quantities, then it is fairly certain that mildew growth on rubber-covered fabric will be practically inhibited.

Where it has been necessary to incorporate inhibitors into fabric, the rubber industry has had available many materials for test and use. Many of these are marketed under trade names. A few of the commonly used materials are salicylanilide, chloro mercuriphenol, thallium carbonate, p-nitro phenol, penta chloro phenol and its sodium salt, tetra brom beta naphthol, and p-chlor phenol. There are many others. It is also true that crude pine tar and some of its fractions are particularly good inhibitors for certain species of mildew. Certain plant extracts and resins when properly treated with specific chemicals will inhibit the growth of other species of mildew. Such methods have been used by various rubber manufacturers.

When the true complexity of the problem is realized and its importance to the rubber industry is properly evaluated, it becomes evident that the question of mildew prevention is merely a service problem similar to many which are encountered, evaluated, and solved every day in the industry.

Summary

Cotton and linen fabricated rubber articles are very susceptible to mildew and if growth of the latter is not inhibited, serious injury to the fabric in the rubber article will result. Exclusion of air and moisture from cotton fabric will inhibit mildew growth. An intact rubber cover will give quite adequate protection to cotton cord and fabric. Extensive study by various organizations and manufacturers has determined that many antiseptics inhibit the growth of mildew. Impregnation of fabrics with a small percentage of suitable antiseptics will give protection to such articles as fire hose jackets, exposed belt plies, rubber covered cloth, etc. The choice of a satisfactory inhibitor is a difficult problem and has been given much study. The protection of cotton and linen fabricated rubber articles against destruction by mildew constitutes a very definite problem, yet its solution is only another step in the direction of better service and longer life for rubber products.

"Joint-Lok" Road Expansion Joints

New Filling Material, Consisting of a Specially Compounded Latex with Fillers, Said to Meet All Necessary Requirements

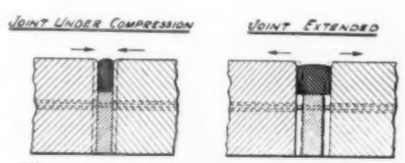
IT is general knowledge that highway engineers have long been seeking a suitable road expansion joint which would meet rigid specifications and which would hold up suitably in all kinds of weather. Experiments with bituminous materials, rubber and rubber latex, combinations of rubber and bitumen, and other single and combination materials, have been reported from time to time with varying success. It is therefore interesting to note that a new material, consisting of a specially compounded latex with fillers, termed the "Joint-Lok" Seal, is reported to cover all the requirements for successful joints in concrete road construction. This new material is being marketed by Rubber Associates, Inc., 1790 Broadway, New York City.

Expansion Joints Are Essential

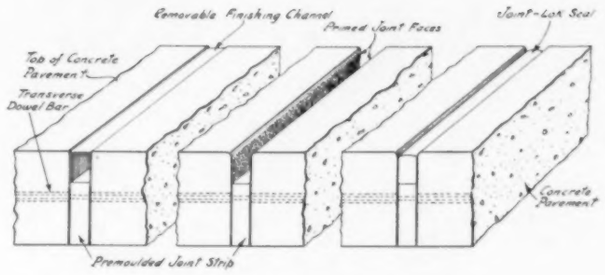
Concrete slabs used in road construction expand with heat and contract with cold. They also swell when wet and shrink when dry. Therefore, the use of expansion joints is essential if smooth roads are to be maintained. Up until a few years ago ordinary asphaltic cements were largely used for filling the joints provided between concrete slabs. Unfortunately, most of these cements contained some undesirable characteristics. That is, if they were hard enough not to flow out of the joints in hot weather, they generally became so brittle in cold weather that the solid filler broke away from the sides of the slabs and thus admitted water from rains or melting snow. On the other hand, if they were soft enough to remain resilient and ductile in cold weather they became so soft in hot weather that they easily ran out of the joints.

It is particularly important that any joint filling material prevent leakage. Once moisture forms on the under side of the concrete slabs it causes an expansion of that side greater than that of the surface exposed to the atmosphere, particularly when dry on a cold day, and results in a warping of the slab and a roughness in riding qualities which usually increases with age. Therefore, in order to prevent leakage, a suitable joint filling material must be impervious, must stick tight to the sides of the concrete slabs, and must be sufficiently elastic so that it will not break away and open up cracks when the concrete contracts or expands.

During various experiments it was discovered that many rubber compositions used as expansion joint fillers had good bond to a continued dry surface but failed when subjected to water for extended periods.



Showing seal in compressed and extended state.



Method of "Joint-Lok" construction.

The usual test period was for one year. The highway departments of several states have been especially interested in this problem for years and have cooperated fully with the Bureau of Public Roads in Washington, D. C. Every opportunity has been given to manufacturers of rubber and latex compositions to install their joint filling materials on concrete roads and results have been carefully checked.

Several states, as well as the District of Columbia, have prepared specifications covering "Poured Rubber Expansion Joint Compounds." That for Washington, D. C., was prepared jointly by local highway commissioners and the Federal Bureau of Public Roads. It specifies a material which shall consist of "a liquid rubber compound (used with or without a primer) which will easily pour into an open concrete joint." The material must set sufficiently in one hour to prevent infiltration of water or other foreign materials, must solidify within twenty-four hours, and once set must adhere to the concrete to properly seal the joint.

Aqueous Dispersion of Rubber Specified

The filling material must consist of "a mixture of an aqueous dispersion of rubber having a solids content of not less than 50% or more than 70%," while the material to be mixed with the rubber compound must be "an inert material having a maximum surface area" and one which "will not show disintegration through weathering." Requirements for a "test joint specimen" are also contained in this specification as are details with regard to bonding, extrusion, accelerated aging and durability, and water absorption tests.

In applying the "Joint-Lok" expansion joint seals developed by Rubber Associates, the materials are furnished to the contractor in separate containers and are mixed on the job as required for actual installation. After being properly mixed, the filler has the consistency of a soft pudding and is ready to be poured over the pre-molded joint strips which separate the concrete slabs. These pre-molded joint strips (see illustration) are laid when the concrete slabs are placed in position on the road surface, and fill the lower portion of the depth of the joint. They may be com-

(Continued on page 106)

VIEWS IN NEW

New Factory at

Operated by

A NEW plant for the manufacture of "Thiokol Synthetic Rubber" has been constructed on the premises of the Dow Chemical Company at Midland, Michigan. In the future the material will be made for the Thiokol Corporation by Dow Chemical. It was formerly produced at Yardville, New Jersey. The Thiokol Corporation will concentrate its efforts in the future on the sale and development of the material, in addition to maintaining a small plant and laboratory in Trenton where the powdered form will be produced.

Dow Chemical has constructed an entirely new plant at Midland. The capacity of the plant is estimated at more than 2,000,000 pounds annually. The accompanying illustrations show various views of the machinery and equipment in the new plant and trace the production of "Thiokol" through its various steps.

The reason for locating the plant in the mid-west is that most of the raw materials which go into the making of "Thiokol" are manufactured by Dow Chemical. Therefore, when new construction was planned, it was felt expedient to build as close as possible to raw material sources. Located on the Dow Chemical premises, the present location is said to simplify production.

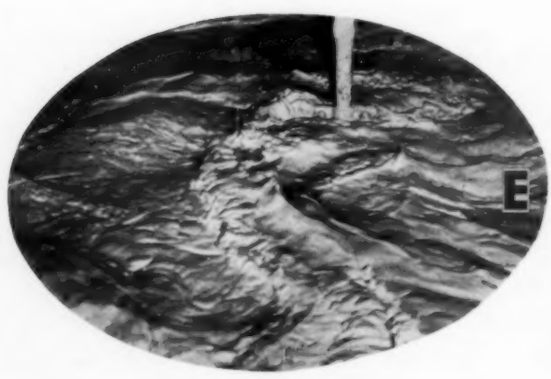
(A) Dumping sulfur from buggy into elevator pit, whence it goes into tanks where it is reacted with other materials to form sodium polysulfide.

(B) Pumping sodium polysulfide from a make-up tank through a filter tank (on right) to outside storage tanks.

(C) Pumping sodium polysulfide from outside storage tanks into the reactor tanks.

(D) Operator releasing a quantity of ethylene dichloride into the reactor tanks where the sodium polysulfide and the ethylene dichloride react to form "Thiokol."

(E) Close-up of "Thiokol" in liquid form after the reaction of sodium polysulfide and ethylene dichloride.



THIOKOL PLANT

Midland, Michigan

Dow Chemical

Three basic steps are involved in the manufacture of "Thiokol," *i.e.*, the manufacture of a polysulfide, the reaction between the polysulfide and ethylene dichloride to form a liquid mass, and the coagulation of the mass to form "rubber" crumbs. Formerly, the production of this material required much manual labor, but in the new plant the process is reported to have been completely mechanized. Mechanization is said to result in a saving of time to the manufacturer and a more uniform product for the user.

Thiokol is available in several different forms and in seven different grades. These include sheets, liquid coating materials, printing plate powders, and molding powders. The sheet material is fabricated by and with the same machinery and equipment used for crude rubber by thermoplastic molding. The outstanding characteristic of polysulfide rubber is its great resistance to oils and greases.

Included among the wide range of products now being made with Thiokol are gasoline and oil hose, spraying equipment, ink-carrying rollers, printers' blankets, printing plates, coated gloves, cable sheathing, automotive parts, and tank linings.

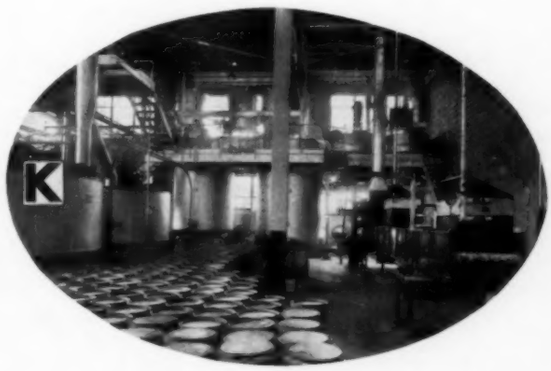
(F) View of washing tanks with temperature recording instruments visible in the left center background. These instruments are essential for control.

(G) Coagulating tanks where acid is introduced to cause coagulation. Acid tank is seen in upper center background.

(H) Coagulated "Thiokol" being discharged into a filter box where it is again washed.

(J) Thoroughly dried coagulated "Thiokol" coming off the continuous belt at the opposite end of drier which may be seen in the foreground of illustration H.

(K) Interior view of the plant showing drums of "Thiokol" ready for shipment to the key rubber centers.



Rubber as a Bearing Material

RUBBER has been found suitable for use as a bearing material where relatively low frictional resistance is required, according to a paper submitted by S. A. Brazier and W. H. Bowyer at a general discussion on lubrication and lubricants recently held in London, England, by the Institution of Mechanical Engineers. Discussing their results with various bearing materials, the authors stated that rubber, being flexible and deformable, can accommodate itself to surface irregularities without destroying the continuity of the water lubricating film, and in this way the surface of the bearing can be kept separated by a film of lubricant which is less than that necessary for equivalent metal surfaces.

In any revolution of the shaft each single point will pass over one or more of the faces of the water-lubricated rubber bearing which are separated by grooves. As the edge of each face is rounded, and owing to the resilience and deformability of the rubber, the load on each face will vary from zero to a maximum value. Because of this, the lubricating film of water is formed at a point of low pressure, and, because of its low viscosity in comparison with oil, when this film is once formed, it is dragged by its adhesion to the shaft through the length of the face, provided the speed of the shaft is in excess of a critical value depending on various conditions.

Grit Does Not Lodge In Bearing

The advantage which rubber possesses in this way is considerably increased when the water used for lubrication contains grit or dirt. Owing to the ease with which the rubber is displaced and its resilience, the particle of grit does not lodge in the bearing, but is depressed into the rubber without cutting, and is then rolled by the rotation of the shaft into the adjacent groove, and so washed away. In addition, owing to this deformation, the unit load on such particles approximates that on the surrounding rubber, whereas on a hard-surfaced bearing the load will rise to a considerable value before it is forced into the bearing or shaft surface.

It therefore follows that any scoring action in a rubber bearing is considerably less than that possible for a hard-surfaced bearing, and that the shaft remains highly polished, instead of becoming deeply scored and, perhaps, grooved. Furthermore, this advantage of rubber is not secured by the sacrifice of life, oftentimes metal bearings being outworn by the rubber types.

Several types of rubber bearings have been developed, the main differences being found in the design of the rubber lining with regard to its effect on the passage of the lubricating water. Its hardness will depend on the general conditions of use, particularly the bearing load. A very hard rubber is unsuitable, as in addition to its being readily cut away by particles of sand or grit, the coefficient of friction obtained more nearly corresponds to that obtained with metal bearings. The rubber used must be resilient, tough, resistant to cutting and wet abrasion, while its permanent set must be as low as possible. In addition, it should be of such nature that, if necessary, it can be ground accurately to size with a suitable fine surface.

The requirements for the successful operation of rubber bearings are briefly as follows: (1) The size of the bore must be accurate and give sufficient clearance for an easy running fit; (2) Owing to the low heat conductivity of rubber, any frictional heat must be carried away by the lubricating water. A continual flow of cooling water is therefore imperative. The bearing must never be run dry, even at starting; (3) The shaft and the bearing surfaces must be smooth and unscored; (4) The lubricating grooves must be placed sufficiently close together, so that the temperature of the water film is not raised excessively; and (5) Oil and grease, especially mineral oil, even in small quantities, can often be detrimental to rubber bearings and cause "tackiness." It is possible by suitable compounding to give the rubber considerable resistance to oil.

Rubber has been used successfully over considerable periods of use in underwater marine work, high-speed motor boats, hydraulic turbines, centrifugal pumps, agitators, washing machines and domestic and industrial liquid-handling equipment. For pumping systems dealing with drinking water, and many solutions or fluids used in the preparation of foodstuffs or beverages, rubber forms an ideal bearing material.

Crease-Resistant Finishes for Fabrics

WITH the advent of crease-resistant finishes in the commercial production of cloths, it has become increasingly important to measure the improvement of the cloths resulting from the finishing treatment and also the resilience of fabrics in general. Work was undertaken recently by the National Bureau of Standards at Washington, D. C., to determine the flexural characteristics of representative woven fabrics before and after the application of commercial crease-resistant finishes. Three different methods were used: (1) Creasing angle; (2) Flexometer; and (3) Modified compressometer. Specimens of rubber, paper, cotton, rayon, worsted and cellophane, which are recognized to vary in resistance to creasing over a considerable range, were also measured and the results used for comparison. A report on these tests by Herbert F. Schiefer appears in the February, 1938, issue of the *Journal of Research*.

The crease-resistant finishing treatments increased the energy required to deform the cloth specimens, that is, increased the stiffness of the cloths. This increase exceeded 100% for some of the cloths. The energy of recovery was also increased by these treatments, the increase ranging from 20 to 100%. Neither of the two quantities can be taken individually as a measure of crease resistance. However, the ratio of the latter to the former is related to the resistance to creasing. The resilience of nearly all of the cloths, as determined by each of the three test methods, was increased by the crease-resistant finishing treatments.

Test Methods Should Prove Valuable

The three test methods described can be used to evaluate the improvement given by crease-resistant finishes, using the measurements on the cloths (or other materials) before treatment as the basis of comparison. They should be valuable in systematic studies of the effect of different finishing treatments and in determining the effects of relative humidity, temperature, and other factors on the different finishes. Method 1, however, does not give a critical measure of stiffness, a property that is greatly affected by crease-resistant finishes and should be measured. The resilience as determined by these methods is dependent upon the testing conditions, as for example, the magnitude of the maximum load in method 3. It may be found necessary, in test methods of this type, to vary the maximum load with the thickness or weight of the fabric to be tested.

Charles Goodyear

CONNECTICUT YANKEE AND RUBBER PIONEER*

By P. W. Barker

CHAPTER 2.

Goodyear Opens America's First Hardware Store

NOW that Charles Goodyear was married, his responsibilities had increased twofold. He continued with his father at New Haven and Naugatuck until 1826 when he moved to Philadelphia to open the first retail hardware store in the United States. Address was 40 Church Alley, an alley running from 20 North Second Street to 11 Third Street, within a block of Rogers & Brothers, his first place of employment, and at about what is now First and Arch Streets. Part of his talent was devoted to a commission business in products of the Connecticut factories controlled by his firm, *i.e.*, from the manufactory of Amasa. Business was conducted under the style A. Goodyear & Sons; therefore, the younger brothers must have had a share in the undertaking.

"Visionary" is Goodyear's own description of his store, and surely it was extremely venturesome in the face of existing competition. At this period Yankee Notions, which meant hardware and not millinery, made in Connecticut, were in the hands of peddlers making regular trips throughout the country. Purchasers had become accustomed also to English trademarks which appeared on a large portion of the hardware in use at this time. The store succeeded, nevertheless, and only a major business panic was to affect it adversely after several profitable years—years in which the Goodyears had money and the comforts that money can buy.

Goodyear Smoked, Chewed and Drank

It has been stated that Charles Goodyear was imbued with a native religious seriousness. Evidence exists, however, that he had formed habits not considered proper of one with the highest principles of personal conduct. On a business trip to New York in 1826, Charles Goodyear wrote his young wife in Philadelphia, "I have quit smoking, chewing and drinking, all in one day." New York life appears to have shocked him considerably, for he told Mrs. Goodyear to forbid in their home thereafter anything stronger than wines and cordials, except in cases of illness.

Contemporary writers mention drunkenness as a national evil at this time. Liquors and wines were so cheap that almost everybody drank to excess, and many very promising men became drunkards. "There were drunken lawyers, drunken doctors, drunken members of Congress, drunken ministers, drunkards of all classes." ("Forty Years of American Life: 1821-1861," by Thomas Nichols). The natural reaction became the first temperance movement. The Holy Bible was read in the Goodyear family circle, and his daughters many years afterwards recalled these intimate religious moments of their father.

Early Sickness from Overwork

Overwork and an attack of dyspepsia, in the winter of 1829 and the spring of 1830, wrecked his frail constitution, and Charles Goodyear was never again to enjoy good health. His wife and his friends feared he would die; the attacks at times were so severe as to threaten his mind. It might be said, however, that in the case of Charles Goodyear and perhaps in that of many another, the diagnosis "dyspepsia" meant almost any acute illness affecting the digestion. What physical ailment does not also affect the stomach and the regular digestive processes? In the absence of an accurate clinical record, it is impossible at this late date to determine the exact disease affecting the patient. His death thirty years later, however, was attributed to gout. And here we have another inaccurate diagnosis. Charles Goodyear did not die of gout, the disease generally associated with the idle rich, the gourmet and the glutton, caused by sumptuous living. That inaccurate diagnosis will be dealt with at a later and more appropriate moment.

Failure in health was followed by business failure. America's first retail hardware store "suspended payment in 1830," *i.e.*, the Goodyears were unable to pay their debts. A. Goodyear & Sons were forced to move the same year from 40 Church Alley to smaller quarters at number 2 and 15 in the same street. Few people realized it, but a major economic disaster was in the offing and the recession of 1830 was merely a warning signal. Inability of Southern accounts to pay the Goodyears was assigned as the principal reason for their lack of ready cash.

Back of it all was the Tariff Act of 1828, called the "Tariff of Abominations," which had increased the price of New England manufactures to the point where Southern plantation owners, the leading customers, could no longer pay. A. Goodyear & Sons, being a small manufacturer operating on a narrow

* A continuation of the biography of Charles Goodyear. The introduction and first chapter to the biography appeared in the April, 1938 issue.

margin, naturally, was among the first failures. But the worst, the dark abyss of the depression of 1837, was not come. It would meet Charles Goodyear at a time when he required financial backing for his rubber experiments, and it would plunge him again into despair.

What to do? Listening to the appeals of the creditors, Charles Goodyear undertook to continue the business with an extension of time for payment. He had originally thought of assignment of his interest in the firm to pay for the failure, but such a course would have meant complete loss of all rights in the unfinished improvements he was making to the tools and hardware being sold. His Yankee idea of fairness also forbade his desertion of those to whom he was indebted. After a short time, however, with impaired financial standing and creditors clamoring for payment, he realized the futility of his position. Accordingly, Charles Goodyear, a junior partner, assumed unto himself the debts of the bankrupt firm and surrendered the remnants of America's first retail hardware store.

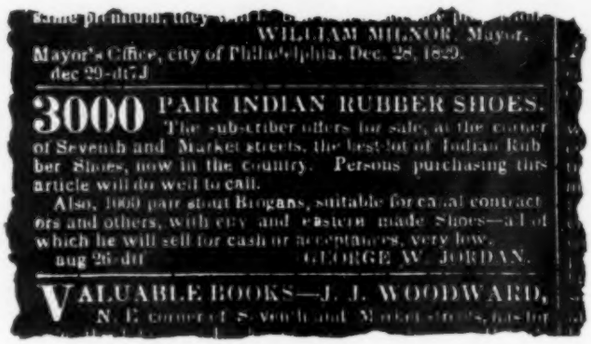
Goodyear the Blacksmith

He was compelled to move again, in 1835, to a small shop in Hartung Alley (between Second and Third Streets, near the Delaware River). Here he engaged in blacksmithing as CHARLES GOODYEAR.' In all probability his younger brother, Amasa, Junior, who had learned the trade of a smith, was with him at this time. His obligations changed from hands of original, friendly creditors to strangers; and for the next ten years, these speculators in the few assets of the bankrupt firm were to seek him out and have him imprisoned on numerous occasions, in different cities, for his inability to pay. As early as 1830, in Philadelphia, he had his first experience with being imprisoned for debt.

Surveying his capabilities and his few assets, Charles decided upon the career of a professional inventor. His father had invented things so why not he? As a matter of fact, his head was full of ideas for new hardware items. Countless other activities were available to him: he could have gone into steam navigation, the railroads, opening-up of the West, or he could have joined the movement for abolition of slavery. For four or five more years he labored with new ideas and his labors resulted in several United States patents, none of which had anything to do with rubber. They were: January 12, 1831—manufacturing buttons called "the safe-eye button;" September 7, 1831—steel spring fork; March 16, 1832—spring lever faucets; August 11, 1832—manufacturing spoons; February 5, 1834—faucets or molasses gates; March 30, 1835—air pumps.

All of these U. S. patents were in the name of Charles Goodyear, of Philadelphia, Pennsylvania. Boats constructed of metal tubes held his attention in 1834 in New Haven, but such boats were not successful, although a similar boat of Goodyear's invention of hollow rubber tubes at a much later date had a small success. Probably a poor living was all the luckless inventor ever derived from them, as they were sold or assigned to the many creditors to pay for the late business failure.

An example of the sickness and death which dogged the footsteps of this patient man may be gained from his family life and history at this time. He had been married in 1824. A daughter, Ellen, was born in July, 1825. Cynthia was born in October, 1827; Sarah Beecher was born in 1830 and died in 1831; Clarissa, was born and died in 1831; and Charles, Junior, was born January 1, 1833, in Germantown, Pennsylvania.


WILLIAM MILNOR, Mayor.
Mayor's Office, city of Philadelphia, Dec. 28, 1829.
dec 29-dtf J

3000 PAIR INDIAN RUBBER SHOES.
The subscriber offers for sale, at the corner of Seventh and Market streets, the best lot of Indian Rubber Shoes, now in the country. Persons purchasing this article will do well to call.
Also, 1000 pair stout Brogans, suitable for canal contractors and others, with city and eastern made Shoes—all of which he will sell for cash or acceptances, very low.
aug 26-dtf GEORGE W. JORDAN.

VALUABLE BOOKS—J. J. WOODWARD,
N. E. corner of Seventh and Market streets, has for

Replica of one of the early advertisements on rubber shoes. This appeared in January, 1830.

In the course of these first ten years of marriage, four daughters and one son had been born, and two of the daughters had died. And he had lost his business, been near death himself, and had gone to jail for debt. This frail and harried man had the very patience of Job, and he was to need it, for he had become interested in rubber.

Rubber had invoked Charles Goodyear's fancy as a youth, according to his own story. He had seen a crude bottle made by Brazilian natives and he had cut a piece from it to erase pencil marks from paper. Peeling a thin film from the bottle, the youth had the thought of making a fabric of the new material. Later he had endeavored to use rubber as a washer in his patent of March 16, 1832, for spring lever faucets, but it had proved unsatisfactory. In 1833 he gave his daughter Ellen, his first born, a pair of rubber shoes while she was attending a Friends School in Germantown, Penna. But in 1834 he really became interested in the new commodity.

Problems of Rubber Manufacturing

On a business trip to New York, Goodyear purchased a rubber life preserver from the local store of the Roxbury India Rubber Factory. He took it home with him to Philadelphia and fashioned a new tube for its inflation. When next in New York, Goodyear called at the same store with the purpose of selling his improvement. His intense interest (and perhaps his impoverished appearance) moved the store manager to tell him the predicament of the rubber manufacturing industry in America at that time. It seemed that rubber goods melted in the heat of summer and cracked with brittleness in the cold of winter. If some one could only devise a means of manufacture to overcome these objectionable characteristics, his fortune would be made, he was told. Furthermore, he was informed that the entire new industry was doomed to failure unless the satisfactory solution were discovered.

Spurred on by Liabilities

Goodyear considered the dire situation of the industry, and he realized the importance and necessity to man's comfort of rubber properly manufactured. From this moment onward, he had a "presentiment, of which he could not divest himself, under the most trying adversity, of ultimately attaining his object." He had debts and many liabilities, and the hope of discharging them spurred him on, as it has so many other great inventors. He was a man of destiny and he knew it! He believed in himself, and nothing was to turn him from the course he had chosen. Charles Goodyear had at last found his purpose in life!

CHAPTER 3.

Rubber Comes to New England

RUBBER is one of the many useful products contributed to civilization by the discovery of America. Christopher Columbus saw it at Santo Domingo in 1498 on his second voyage, and one of his crew, Bartoleme de Las Casas, wrote about it. Other historians writing of the New World told of the Indians playing games with bouncing balls made from the "juice" of trees, of Emperor Montezuma entertaining Hernando Cortez and his soldiers in Mexico City with such a game played by his nobility.

It remained for Francois Fresneau and Charles Marie de la Condamine to bring rubber to the attention of Europe. These two French scientists had spent several years in extensive work and travel in northern South America, and they had seen the use of rubber by the natives. This was in the period from 1736, when La Condamine first mentioned rubber in his records and sent samples to Europe, to 1751, when his letter transmitting the comprehensive report on rubber by Fresneau was published by the French Academy. Authorities now claim that Fresneau was the first white man to realize the commercial importance of rubber, but heretofore history had given practically all the credit to La Condamine.

Rubber Syringes of the Indians

Despite Fresneau and La Condamine and the French Academy, rubber continued to be little more than a curiosity in Europe. Indians in the Amazon Valley, however, did many things with it: they made shoes, waterproof clothing, battle shields, and bulb syringes. Different accounts have been told as to the exact use of the bulb syringe, which was nothing more than a rubber bottle with a hollow reed thrust into its neck. Early dictionaries claim its use for squirting water at dinner guests in playful mood and for syringing the teeth after the dinner. La Condamine who mentioned the syringe was rather indefinite in his record, and it is possible to assume from his meagre statement that its use was medical, as an injection syringe for enema. It was in the form of syringe bulbs (or bottles) and shoes that rubber first made its appearance in the markets of Europe and the United States.

Brazilian native rubber manufacture was of necessity a crude process. Nevertheless, not until the discovery of Charles Goodyear were white men able to produce an equal or better product. It was practically nature's own process in its very simplicity, and there is every evidence that it had been used from the Tenth Century or even before the dawn of history on the American continent. The rubber-bearing trees were scarred, causing the milky juice to run. Covering the naked foot with many coatings of the juice and drying in the sun formed a complete shoe which could be removed and replaced. It protected the foot from injury and it was waterproof. Instead of the human foot as a last, clay molds of foot size were used, and in this manner bottles and other objects were formed.

A variation of this process was introduced in which the last or mold was smoked after each dipping or coating of latex. Hulls of Brazil nuts were plentiful and it was soon discovered that their acrid smoke and the warmth of their blaze was more beneficial than sun treatment, resulting in an improved product. In the early 1830's New England rubber shoe importers sent wooden lasts to Brazil for use in manufacturing rubber shoes. This development occurred to insure correct foot size and only after Yankee ingenuity had failed to equal native workmanship and processes.

Fresneau died in 1770, the same year that Dr. Joseph Priestley, English scientist, recommended the use of rubber for erasing pencil marks from paper. Englishmen probably gave the commodity its name of "rubber," with its adjective "India" to denote its supposed origin in the West Indies, and most casual historians give Priestley this credit, although he called it "a substance." He stated its price, which figures out to $175.00 a pound, and named its seller, Nairne, mathematical instrument maker of London.

> "Since this work was printed off, I have seen a substance excellently adapted to the purpose of wiping from paper marks of a black-lead pencil. It must, therefore, be of singular use to those who practice drawing. It is sold by Mr. Nairne, mathematical Instrument-Maker, opposite the Royal Exchange. He sells a cubical piece, of about half an inch, for three shillings; and he says it will last several years." (From preface to "Introduction to the Theory and Practice of Perspective," by Joseph Priestley, London, 1770).

From 1770 to 1791 many men of science had experimented with rubber. Among them should be mentioned Herissant and Macquer, French chemists. In 1791, Samuel Peal obtained an English patent, the first for rubber, and man was beginning to understand the new product. Peal's process, which embraced the waterproofing of cloth with a solution of rubber dissolved in turpentine, was to be the basis for rubber experiments and manufacture for the next fifty years. He perhaps is another rubber immortal who has never received due advertisement.

Rubber, in the form of bottles, in all likelihood had come to New England earlier than 1800. Definite records do not exist as to the name of the first importer, but Robert Upton, of Salem, Massachusetts, was among the earliest. Its use probably was for erasing pencil marks. A patent almost identical to that of Peal was registered in the U. S. Patent Office in 1813 by Jacob F. Hummel, of Philadelphia. Other early U. S. patents were granted to A. Dana, of Boston, for waterproofing boots and shoes (1821); Arnold Buffum, of Smithfield, Rhode Island, for manufacturing waterpoof boots and shoes (1822); Patrick G. Nagle, of Philadelphia, for waterproof boots and shoes (1825); and J. T. Howe, of New York, for flexible and air proof cements, paints, etc. (1829).

Experiments of Thomas Skidmore

About the same time, 1820, that Thomas Hancock and Charles Macintosh were experimenting with rubber in England, one Thomas Skidmore was busying himself similarly in the United States. Volume V, of 1822, of Prof. Benjamin Silliman's *Journal of Science and Arts*, (of Yale College), carried a letter from Thomas Skidmore, which had been accompanied by samples, on the manufacture of rubber tubing. This manufacture predated by several years similar manufacture by H. B. Leeson and Thomas Hancock, both of England.

Thomas Skidmore, a mechanic of note, was interested in perfecting a tube for Hare's blowpipe, the invention of a Philadelphian by which hydrogen was burnt in an atmosphere of oxygen thus giving high temperatures for metallurgical and chemical experi-

ments. But Skidmore was more interested in social reform, becoming the moving spirit of the Working-Men's Party of 1829 which was ridiculed in the press as the "Dirty Shirt Party," and submerged by the depression of 1837 and by the unconventional conduct of its own party members.

Things were happening to rubber in the early 1820's in England and on the Continent. As a matter of record, it is believed that the first rubber factory in the world was that of J. N. Reithoffer, established in Vienna, Austria, in 1811. Likewise, experiments were being made in the United States. James Tyler, Jr., experimented with rubber coatings on leather by dissolving rubber in ether, in his Chatham Street store, in New York, as early as 1819. Rubber historians have given too much praise to foreign men of science to the detriment of those laboring in New England. Our rubber industry was nowise a satellite to the foreign industry.

It must be remembered that rubber manufacture in the early days was a secret undertaking; patents meant little protection to the patentee, and new ideas and processes had their birth and trial behind barred doors. British and European rubber-workers were not divulging trade secrets to workers in what they considered "the American wilderness." It will be remembered also that Thomas Hancock kept his "pickle" (or masticator) a secret from his own workers, for many years.*

Most spectacular of the early United States rubber business was the importation and sale of shoes made in Brazil. This trade began in 1820, with the entry of a pair of gilded rubber shoes with pointed toes into Boston to excite a purchaser to pay the price of $5.00. Importers at first were druggists, but later the trade was largely engaged in by importers and dealers in leather footwear. By 1830 large quantities of Brazilian-made rubber shoes were coming into United States ports, and single advertisements for as many as 5,000, 10,000, 15,000, and even 30,000 pairs, were carried by the Boston papers in 1833.

What an exciting trade it was! And how very profitable! Cost price was as low as 25 cents per pair and retail price was 50 cents to $2.00 or more. Demand was spirited. The brig would enter the harbor, after a long voyage, and all the town would be at the wharf in their finest apparel to see the sails furled and to see the strange, foreign cargo being landed. It was a moment of joy and celebration.

Preparing Rubber Shoes for Sale

If the ship carried rubber shoes, and the chances were that it did if it had touched South America, the importers would board the ship immediately and then hurry off to the cellars and lofts of their stores with the boxes and bundles of shoes. No prying eye must witness the opening of these packages, nor see the mysterious labors of the importer and his assistants. Important work must be done. The shoes must be made ready for next day's sale.

First, cut the stitches holding the pair together; second, empty out grass, straw and seaweed stuffed into each shoe to keep its form; third, wash off bloom of rubber and clay stains left from mold; fourth, heat and stretch over last to fit larger feet of Yankees; fifth, trim rough edges with scissors and apply blacking and varnish to give shine; sixth, and final, remove from last and mark size and price.

Women and boys did this work, and many were the screams when a scorpion or other tropical pest was emptied out in their midst with the grass and straw. All night the importer and his assistants must work to be ready for the sale. Only enough shoes were made up for immediate needs. Sometimes the shoes did not remain sold. Customers returned shoes that had shrunk. That was easily remedied: merely reheat and stretch over last. Rubber shoes tore easily, stones penetrated soles, heat softened them, and cold stiffened them. Resoling was easy: scrape the bottom of the shoe and pound on a sole cut from a discarded shoe—nails and cement were not required, as heat of blows made sole and shoe one piece.

Some Early Rubber Advertisements

Thousands of newspapers were published in the period 1820 to 1860, it being estimated that in 1860 we had more papers than all the rest of the world together. Mortality of newspapers, naturally, was great, and complete files are no longer available. Paper used was poor, type small, and few headings were inserted to guide the reader. Despite the difficulty of search, considerable information is in these old papers. An early advertisement appeared in the February 12, 1824, issue of the *Independent Chronicle and Boston Patriot*, as follows:

> GUM ELASTIC SHOES—Forty pairs of superior quality and good size this day received by I. W. Goodrich, No. 76 State street. These shoes will be warranted to keep the feet dry as well as warm, and if on trial they should not do so, the money will be refunded. Five hundred pairs have been sold in this city wtihin one year and they have given perfect satisfaction.

Druggist Isaac W. Goodrich, also a stationer, appears to have been considerably involved in the rubber trade. His advertisement inserted in three or four issues of the *Columbian Centinel*, of Boston, beginning with the issue of March 13, 1824, was for:

> INDIA RUBBER BALLS—For sale by I. W. Goodrich, No. 32, State street.

In the same paper, but issue of December 14, 1824, Goodrich had another rubber product for sale. It will be noted also that his address was different for each advertisement.

> INDIA RUBBER OVER SHOES. 398 Pairs India Rubber Over Shoes, of a superior quality, this day received, and for sale at low prices, by I. W. Goodrich, Stationer, No. 8 State street, second door from Cornhill.

Another Boston store engaged in the sale of Brazilian rubber shoes was Allen's Stationery Store, 72 State Street, sign of the Golden Arm, who called the new product Gum Elastic Shoes in its advertisement of November 6, 1824, in the *Columbian Centinel*.

New York and Philadelphia do not appear to have had advertisements until 1830:

> GUM ELASTIC SHOES—200 pair for sale by Seth Low, 22 Exchange-place. (New York Commercial Advertiser, January 7, 1830.)

> 3000 PAIR INDIAN RUBBER SHOES. The subscriber offers for sale, at the corner of Seventh and Market streets, the best lot of Indian Rubber Shoes, now in the country. Persons purchasing this article will do well to call. (U. S. Gazette, Philadelphia, January 1, 1830.)

Rubber had come to the United States, and with the enthusiasm so characteristic of Americans, everybody wanted a pair of rubber shoes. There was one disheartening thought, however, in the minds of shoe importers. Why must Yankee genius depend upon semi-wild natives in Brazil for their rubber shoes? *We should make our own rubber shoes!*

(To be continued)

* This biography is devoted to Charles Goodyear and to the United States rubber manufacturing industry. Foreign events in rubber will be omitted or given only casual treatment, save in those instances where they impinge sharply upon identical events in the United States.

Safety Device for Capped Fuses

CARRYING capped fuses to working places in mines and quarries has always been a dangerous occupation. This danger has been considerably lessened by the invention of a safety device made of rubber. Invented by R. J. Murray, a Colorado state mine inspector, the device consists of a cylindrical rubber block 3½ inches in diameter and 3 inches deep with perforated holes to insert 25 fuses, each with cap attached. There is also a flared hood of rubber which is drawn down over the block while the container is being loaded. This hood is pulled back around the projecting coiled lengths of fuse and securely tied at the top. The container is carried by means of a shoulder strap.

With the hood drawn back, capped fuses are inserted, one at a time, in the new rubber safety device.

The new safety device, described in a recent issue of the *DuPont Magazine,* was developed by Mr. Murray in conjunction with the Gates Rubber Company and the Climax Molybdenum Company. It has withstood unusually severe drop tests. For instance, one container fully-loaded with capped fuses was dropped 100 feet on solid rock with no detonations resulting. In another test, 25 capped fuses, trimmed to different lengths, were loaded in a container with the free ends of each fuse brought together and ignited. Each cap exploded in its regular sequence, thus proving the effectiveness of the rubber in absorbing repeated shocks. A close examination of the container after this test revealed that not any of the flying copper had penetrated through the rubber.

Rubber Springs for Automobiles

THE success of large industrial and street car mountings made of rubber indicates the practicality of replacing the steel springs of automobiles with rubber, according to a paper on "Physics of Rubber as Related to the Automobile" given by Dr. Warren F. Busse, director of the physical research laboratory of the B. F. Goodrich Company, Akron, at a recent symposium held by the American Institute of Physics in conjunction with the University of Michigan.

It has already been pointed out, according to Dr. Busse, that if used in tension a rubber spring will store some seven times as much energy per unit volume, or some fifty times as much energy per unit, as will steel. If the steel is put in the form of helical springs, and the rubber is used in shear as in street car springs, the comparison at 4,000 pound load, according to Hirshfeld and Piron, becomes:

	Rubber Spring	*Steel Spring*
Energy absorbed per inch of space ...	16.5 in./lb.	27 in./lb.
Energy absorbed per lb. of material ..	374.0 in./lb.	237 in./lb.

Dr. Busse also stated that the problem of replacing steel springs with rubber in the automobile involves developing a mechanical construction which will magnify the distortions of the rubber so that it will carry high loads and yet have a very soft load-deflection curve. Among the various methods of accomplishing this, pneumatic devices having air under pressure held in flexible rubberized fabric bags have been suggested. A very simple method now being tried is to use rubber springs in torsion. These torsion springs can be "wound up" to support high loads, and yet have a soft load-deflection curve. The small amount of creep or elastic after-effect that may develop after a few years service can be easily compensated by various means such as slight increase in the initial twist given the springs.

Testing Rubber Floor Coverings

IN AN effort to determine the type of flooring best suited to meet the exacting and difficult conditions found in the workroom and on the loading platform of a post office, the National Bureau of Standards, Washington, D. C., made a number of accelerated wear tests during the winter of 1936-37. Special testing apparatus, designed to duplicate wear conditions in the field, was developed. This apparatus and the results of tests on six different types of floor coverings, 20 specimens in all, are given in Research Paper 1046.

The first sample of rubber tile tested could not be made to stick to the concrete sub-flooring used throughout the tests. It was finally taken up and replaced by sheet-rubber flooring ¼-inch thick. A second sample of rubber tile was later tried and adhered somewhat better, but it too gave trouble and the tiles had to be replaced every few days. Based on wearing tests, the results indicated that linoleum and rubber tile were to be preferred for post office use over the concrete, wood, magnesite and asphalt types of floor coverings, providing that a suitable adhesive can be found to hold either material more firmly to the concrete.

Phenolic Resin Adhesive

A NEW phenolic resin adhesive which is said to have exceptionally high bonding strength in solution in a hydrocarbon solvent, has been developed by General Plastics, Inc., North Tonawanda, N. Y. Known as the company's 5116 Resin Adhesive, the new material is reported to be particularly efficient in bonding rubber to metal or cellulose acetate; asbestos to sheet steel; plastic molded parts; porcelain enameled parts; and cellophane or treated papers to steel, copper wire or wood. It is unaffected by water, moderate heat, alkalies, or mild acids. Used as a coating, it withstands a 50% caustic soda solution indefinitely, according to its manufacturer. The new resin is said to have a softening point between 115° and 120° C. (ASTM), and to retain its bonding strength up to 100° C.

"Joint-Lok" Expansion Joints

(Continued from page 97)

posed of cork, rubber, or other approved materials.

The surfaces to be joined together by the expansion joint filler must be thoroughly cleaned of all foreign matter and be substantially dry. A priming compound must also be applied to the dry surfaces to be joined. The primer is generally applied with a stiff brush to the thickness of a heavy brush coat, and is allowed to set for a few minutes until tacky before the filling solution is poured. An ordinary pouring can, such as a watering can, with a ¾-inch or 1-inch spout, is used for pouring.

According to Rubber Associates, the "Joint-Lok" Seal has been thoroughly tested and is found to be impervious to water, to bond well to the sides of concrete slabs (when coated with a priming compound), to be sufficiently elastic to adhere to the concrete sides both during expansion and contraction of the slabs, and otherwise to answer the requirements of a successful expansion joint material.

Report on Industrial Research

EVERY year the Department of Scientific and Industrial Research (of England) renders a report to the Government on the progress made by various governmental and independent technical and scientific organizations in industrial research. The latest report —Annual Report for 1936-37—has just been made public. It deals with the work of the Rubber Growers' Association, the Research Association of British Rubber Manufacturers, and other organizations. The following paragraphs constitute extracts from the report dealing with the work of the Research Association of British Rubber Manufacturers:—

The changes in the properties of vulcanized rubber with age have been extensively studied because they form one of the limitations to the use of rubber articles. It must not be assumed from this statement, however, that these changes are always so rapid as to render rubber articles short-lived. Owing to the extreme slowness with which aging changes take place accelerated tests are needed to indicate the probable life of rubber products.

The comparative study of accelerated and natural aging is a form of long-term investigation. The Rubber Research Association has undertaken a number of such comparisons, the most extensive of which, dealing with inner tubes, has just been completed. This involved the aging, during some six years, of a comprehensive range of British inner tubes under storage conditions in Great Britain and in the hot climate of Egypt, samples being periodically withdrawn and tested; samples were also submitted to the Geer oven accelerated test. The results have shown clearly how far the latter can be relied upon to predict the life of rubber, and have also indicated how the deterioration which occurs during aging should be assessed.

Another aspect of the same problem is the correlation of different accelerated aging tests. Recent work of the Association has shown the need for caution in substituting one form of test for another, a matter which often tends to be overlooked. A critical survey of the whole subject, indeed, has made it clear that a number of different chemical and physical processes are involved in aging. Some of these are caused by oxidation and some not; since, moreover, it is highly unlikely that all these processes have the same temperature coefficient, it is scarcely to be expected that the natural aging changes can be exactly reproduced at a greatly accelerated speed simply by intensifying temperature or oxygen concentration or both—a conclusion which is amply borne out by practical experience.

Two recent developments in rubber technology have given great practical importance to the somewhat abstruse subject of whiteness measurement. In the first place latex is now being increasingly used for the direct manufacture of rubber goods and for many other purposes, and consequently whiteness has become an important characteristic in the marketing of latex. In the second place, the extensive use of white or brightly colored rubbers has necessitated a great deal of work on white pigments, which involves comparing the "whitenesses" of rubbers containing them. The Association has accordingly examined various instruments used for measuring color and whiteness, chiefly to determine their suitability for testing latex.

This experimental work follows upon a critical study of the theory of color and whiteness measurement and of measuring instruments. This work, besides showing the limitations of the human eye as a measurer of whiteness, forms a valuable guide to all those who need to measure color in connection with the marketing or use of latex, the manufacture or use of white pigments or white rubbers, or the use of other white materials.

The report also revealed that the R.A.B.R.M. had conducted experiments on rubber floorings, including a study of the fading effects of several intense artificial light sources in comparison with sunlight, these experiments reaching a point where the Association will shortly prepare a British Standard Specification for Rubber Flooring. A study was also made of electricians' rubber gloves with special reference to the question of standard sizes and to their durability, as well as a study on rubber mats for switchboard platforms. Recommendations for a standard specification on this latter item will soon be made, and it is hoped that adoption of such a standard will assure protection to the worker, insofar as the rubber is concerned.

Finally, the report revealed that the Association is working on a complete revision of the system of classification of rubber information which it has used for the past ten years. One outstanding application of the revised system will be the formulation of a Digest of British Rubber Patents which will bring into an immediately accessible form everything about rubber found during the examination of approximately 1,000,000 British patent specifications extending over the past 150 years.

"Rug Sta" Slip-Proofing

THE use of latex on the undersurfacing of rugs and carpets has been widely adopted in the past few years. As a general rule, this application is performed by the manufacturer of the rugs or carpets. Now, however, it is possible to purchase suspensions of latex in water in bottle form and apply it in the home. One such product is "Rug Sta," made by the A. S. Boyle Co., Inc., Jersey City, N. J. "Rug Sta" is ready to use just as it comes in the bottle. When applied on the backs of rugs or carpets it forms an invisible slip-proof film that lasts about two years. The rug does not adhere to the floor surface, but is merely made skid-proof. "Rug Sta" is available in 12-ounce and quart bottles at hardware and department stores. In addition to its use on rugs and carpets, it may also be used to spread a film on the felt base of dial telephones to hold them firmly in place, as well as for other obvious uses in the home.

New Equipment

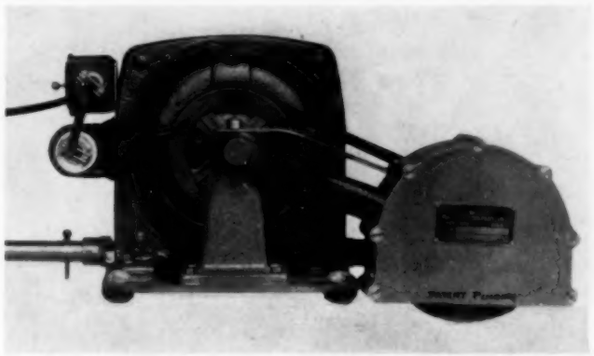
Royle Perfected Extruding Machine

PRIMARILY intended for laboratory service, but also suitable for the production of small tubes, solids, and fine wire insulation, the Royle Perfected Extruding Machine No. ½, with a cylinder diameter of 1⅛ inches, has been developed by John Royle & Sons, Paterson, New Jersey. This machine, the smallest extruder ever marketed by Royle, was designed to fill a growing demand in the rubber and plastic industries. Attempting to extrude very small sizes on a machine of medium or large capacity usually means wasteful

bleeding of stock, if not churning, heating, and premature curing in the machine. The restricted die outlet builds up excessive pressure which may cause breakage or burn out the motor. The new, small extruder avoids these conditions. The usual forms of head sections are offered with the Royle No. ½ in miniature—steam-jacketed, bored and threaded to take die fixtures, known as the standard tubing head, soapstone head, and Crescent side-delivery insulating head, respectively. The cylinder is of the end-mounted type, complete with accessories. A chest comprising four valves, suspended from the cylinder, controls a positive circulation of steam or water through the jacket of the cylinder and separately through the head surrounding the die. An oil bath for the driving worm and bearings provides cooled lubrication. The stock screw, milled from special alloy steel, is progressively diminishing in pitch, and may be had solid or water-cooled. Effective lubrication is provided for both the stock screw and the thrust bearing, the latter being an enclosed roller unit. For usual service, a 1 h.p. motor attached to a special adjustable base furnishes power through a double V-belt and grooved pulleys. Belt tension may be easily adjusted. Normal die range for tubing of the new extruder, which can be extended if desired, is 0 to ½-inch. The extruder weighs approximately 350 pounds without motor, is 39 inches high to the feed throat and 36⅞ inches high to the center of the die, and occupies a floor space of 17 x 33 inches.

Spadone Mold Cleaning Machine

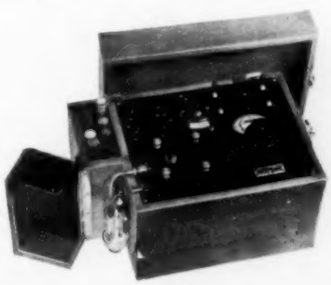
A NEW machine for cleaning corrugated plates or molds, designed to operate within the press opening and thus avoid the necessity of removing the plates from the press, has been developed by the Spadone Machine Co., Inc., 122 East 25th Street, New York City. The machine consists of a bed plate fitted with wheels upon which is mounted a 1 h.p. motor and members supporting a wire buffing wheel. The wheels



supporting the machine are flanged and track in the plate corrugations assuring travel in a straight line. The buffing wheel is held in contact with the plate under spring pressure, spring tension being adjustable to suit conditions. The arm supporting the wire wheel is reversible, thus permitting all sections of the plate to be reached and cleaned. Use of the new cleaner will not scratch or mar the plates. In operation it is pulled back and forth the entire length of the press by means of ropes. Two men can clean a plate approximately 25 feet long by 42 inches wide in less than three hours. The new cleaning machine is simple in construction, sturdily built, entirely self-contained, weighs 110 pounds, and measures 19¼ inches in length, 19¼ inches in width, and 10¾ inches in height. The wire buffing wheel is 6 inches in diameter, with a 2¾ inch face, and is driven by a V-belt. All of these dimensions can be altered to meet unusual conditions if necessary.

New Universal pH Indicator

DESIGNED to read directly in pH with glass, quinhydrone, hydrogen, or any other electrode following the Nernst equation, an improved Universal pH Indicator was recently introduced by the Leeds & Northrup Company, 4934 Stenton Avenue, Philadel-



phia, Penna. Setting the dial of the temperature compensator adapts the entire pH scale on the new indicator to measurements at that temperature when it is used with a glass electrode system or when a quinhydrone electrode is substituted for the glass electrode.

It is equipped with a voltage scale as well as a pH scale so that it may be used in oxidation-reduction potential measurements, and in current and resistance determinations. The newly-designed glass electrode furnished with the indicator is small, rugged, and can measure samples as small as 5 ml. Features of the improved indicator include quartz insulation where necessary to avoid leakage errors, a separate battery compartment to prevent corrosion, unimpaired accuracy in atmospheres of up to 95% relative humidity, and the ability to make sodium corrections where necessary directly in pH units. A complete description of the indicator is contained in Catalog E-96 (1) which Leeds & Northrup offers to those interested.

Ames Dial Scale No. 21

A POCKET GAUGE that measures direct in 64ths, 32nds, 16ths, 8ths, and larger fractions of the inch, has been introduced by the B. C. Ames Company, Waltham, Massachusetts. Known as the Ames Dial Scale No. 21, the new instrument is handy for picking out drills, reamers, taps, round or flat stock and odd-

shaped parts. It is said to be accurate enough to check sizes of work-in-process and finished goods, to be quick acting and easy to read, and to be thin enough and light enough to be easily toted in the vest pocket. Moving the finger forward and backward against an operating wheel at the top of the gauge causes the spindle and upper anvil to raise and lower and the dial to turn, the exact measurement of parts placed between the anvils appearing in the dial slot. The figures are said to be large and the lines widely spaced because measurements are amplified.

Light-Duty Overhead Trolley

SUITABLE for use with the endless chain power operated trolley conveyors, or as individual trolleys manually operated, a light-duty all-purpose anti-friction trolley was recently developed by the Mathews Conveyor Company, Ellwood City, Pensylvania. The outer shell of the new trolley is made of ⅛-inch thick steel; the ball bearing incorporates a patented seal composed of a steel and felt labyrinth; the bearings are self-contained and are furnished "grease-packed" or without lubrication; while the inner and outer ball races are of solid steel, 3 point contact, enclosed within a steel jacket.

Booklets, Catalogs, etc.

The Rubber Industry in Ohio. (Occupational Study No. 1). By Mary J. Drucker. National Youth Administration in Ohio, Clinton Building, Columbus, Ohio. 8½x11 in. 76 pp.

This is the first of a series of occupational studies being made by the National Youth Administration for the purpose of (1) acquainting young people with various occupations and so help them in planning their future work, (2) supplying citizens with accurate and recent information on major industries and the workers performing tasks in such industries, and (3) assisting workers to comprehend the importance and relationship of employees in various occupations. The study gives a brief history of the rubber industry, a step-by-step description of the production of tires and tubes, mechanical goods, molded goods, and other products, and then launches into an analysis of the types of work available in rubber factories and average earnings of the respective workers. The author of the study visited 27 factories, talked with company officials, workers and union representatives, and consulted the literature. Simply written, the survey should prove of interest to members of the rubber industry as well as to vocational counselors for whom it is primarily intended.

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Composition and Structure of Hevea Latex. (A reprint). By A. R. Kemp. Bell Telephone Laboratories, Inc., 463 West St., New York City. 6x9 in. 12 pp.

Data and present views relating to the composition and structure of the latex particles are given in this booklet. The particle structure of sheet rubber is also discussed, the suggestion being made that plasticization by milling involves the conversion of the gel hydrocarbon shell on the rubber particles to sol rubber through oxidation. It is a reprint of the paper delivered by the author before the Rochester, N .Y., Meeting of the Rubber Division, A.C.S., in September, 1937, which later appeared in the February, 1938, issue of *Industrial & Engineering Chemistry*.

•

Rubber-Growing: Elementary Principles and Practice. (Planting Manual No. 7). Compiled by A. Moore. The Rubber Research Institute of Malaya, Kuala Lumpur, F.M.S. 6x9¾ in. 82 pp.

This manual, prepared from material supplied by members of the staff of the R.R.I.M. and information from the Department of Agriculture of the Straits Settlements and the Federated Malay States, is intended primarily for the use of small plantation holders. It is divided into 21 chapters and covers such subjects as planting, soil erosion, manuring, tapping, making sheet rubber, mouldy rot and other diseases, pests, and disinfectants, fungicides and insecticides. It is liberally illustrated.

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DeVilbiss Industrial Equipment. (Catalog "ID"). The DeVilbiss Co., Toledo, Ohio. 8½x10¾ in. 28 pp.

This catalog, which renders obsolete all previous editions of the company's industrial catalogs, covers the complete line of industrial spray-painting and finishing equipment made by DeVilbiss. It describes, in condensed form, spray guns, feed tanks and equipment, special containers, air and fluid hose and connections, spray booths, exhaust systems, air compressing outfits, and other equipment.

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Tell America Truth About Business. By W. O'Neil. General Tire & Rubber Co., Akron, Ohio. 3¾ x 9¼ in.

This booklet condenses the talk given by Mr. O'Neil, president of General Tire, before the Advertising Club of New York recently. It also includes a number of editorial comments made in the newspapers and in the trade press on the subject matter of the talk.

Symposium on Consistency. American Society for Testing Materials, 260 South Broad St., Philadelphia, Penna. 6x9 in. 74 pp. 85c.

In addition to a review of present-day practices this symposium includes a discussion of theoretical background and existing nomenclature and also considers the possibilities of standardization in consistency measurements. Nine technical papers with considerable discussion comprise the publication. Materials discussed include rubber and rubber compounds, coal tar, petroleum products, asphalts, plastics, and insulating materials. The Symposium was originally held in New York City in June, 1937.

•

The Limitations of Rubber. III. Influence of Petroleum. (Report No. 38-4). By Neil L. Catton. Rubber Chemicals Div., E. I. du Pont de Nemours & Co., Inc., Wilmington, Del. 6¼x9½ in. 17 pp.

The third in the series of investigations being made by DuPont on the limitations of rubber, this report treats with suggested methods for making the most oil-resistant rubber compounds. Data is given on the theory of oil resistance and on oil resistance tests. Comparisons of oil resistance of neoprene and rubber stocks with equal loading and at equal hardness are given. Results of physical tests on special compounds for oil resistance are also included.

•

An X-Ray Study of Stretched Rubber. (A reprint). By Henry A. Morss, Jr. Simplex Wire & Cable Co., Cambridge, Mass. 8x10½ in. 5 pp.

Representing a contribution from the Department of Physics of the Massachusetts Institute of Technology, this booklet is a reprint of the article which appeared in the *Journal of the American Chemical Society* (Vol. 60, p. 237, 1938). It gives data on some investigations of the configuration of the molecule and the changes in its shape during stretching and retraction. Possible methods of finding the true unit cell are described.

•

Properties of Sponge Rubber as a Material for Damping Vibration and Shock. By C. W. Kosten and C. Zwikker. The Rubber Foundation, 182 Heerengracht, Amsterdam, Holland. 6¼ x 9½ in. 16 pp.

Reprinted from *Physica*, this booklet describes investigations made by the authors concerning the factors on which the vibration damping properties of sponge rubber depend. Suggested formulas are given, while the choice of sponge rubber and the way of utilizing it in order to obtain the best results are discussed.

•

Let's Take a Look at Monarch. (Bulletin 180). Monarch Machine Tool Co., Sidney, Ohio. 11x14 in. 36 pp.

This bulletin presents a pictorial trip through the Monarch plant with captions describing the various divisions and individual machines and appliances. Monarch specializes in the manufacture of lathes. Large illustrations plus brief descriptions make it easy to read this new catalog which is well printed and attractively bound.

•

Oak Hytex Toy Balloons. Oak Rubber Co., Ravenna, Ohio. 7¾x10¾ in. 48 pp.

The wide and varied line of toy, novelty and premium balloons made by Oak Rubber are illustrated in color and fully described in this new catalog. Stratosphere, toss-up, spiral, nobby, and other types of balloons, in decorative, transparent, mottled, and other treatments are included.

•

Equipping Industry for Continuous Production. Mathews Conveyor Co., Ellwood City, Penna. 8½ x 11 in. 32 pp.

This book is a pictorial presentation of the entire line of conveying equipment featured by the company, with adequate descriptions accompanying the illustrations. It is primarily of interest from the standpoint of the application of various types of conveyors in numerous industries. It contains several references to rubber factories.

A Method of Measuring, and an Apparatus for Determining the Elastic Behavior of Elastic Substances. (A reprint). By C. W. Kosten and C. Zwikker. The Rubber Foundation, 182 Heerengracht, Amsterdam, Holland. 6¼x9½ in. 18 pp.

After an introduction dealing with mechanical vibrating systems, the authors describe a special apparatus for determining the plastic and elastic behavior of such elastic substances as rubber, cork and felt. From observations secured from the apparatus the internal friction and the compliance of the substances can be calculated. The article originally appeared in the March, 1937, issue of *Physica*.

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Plastics. (A reprint). By S. Ranganathan and H. K. Sen. Indian Lac Research Institute, Namkum, Ranchi, Behar, India. 5¼x8½ in. 26 pp. (In English).

The origin, growth, and possible future trend of plastics are described in this booklet. Approximately two pages are devoted to the use of hard rubber as a plastic material, while some mention is made of the so-called synthetic rubbers. It is a reprint of an article which appeared in the *Proceedings of the Institution of Chemists of India* (Vol. IX, Part III, 1937).

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Linear Mechanical Packings. Linear Packing & Rubber Co., Inc., 6400 State Road, Philadelphia, Penna. 8½x11¼ in. 112 pp.

This is a new complete manual and data book on mechanical packings of various compositions, so arranged that reference to it will enable any user of packings to quickly select the kind and type best suited for particular service and conditions. Sizes, weights, footage, and other data are given. The packings are illustrated and described in detail.

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Seedine: Addenda. (Bulletin 104-A). Woburn Degreasing Co. of N. J., Harrison, N. J. 8¾ x 11½ in. 5 pp.

Results of comparative tests of Seedine in comparison with stearic acid as an activator of Captax are given in this supplemental bulletin to that on the properties, uses and advantages of Seedine (Bulletin 104). In one case the results are from an independent laboratory and show the modification in formula necessary to improve the abrasion, tensile strength and aging resistance of rubber.

•

Neville Coal-Tar Solvents. Neville Co., Neville Island, Pittsburgh, Penna. 6 x 9 in. 32 pp.

Properties and applications of the various types of coal-tar solvents developed by Neville are given in this booklet. Data is furnished on miscellaneous types of benzols, toluols, xylols and refined hi-flash naphthas, as well as on crude heavy solvent, high boiling crudes and heavy naphthas. The booklet has an index and includes temperature conversion and specific gravity conversion tables.

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Schedule of Rubber Goods Manufactured by Societa Italiana Pirelli. Societa Italiana Pirelli, Milan, Italy. 6¾x9½ in. 32 pp. (In English).

The wide range of rubber products made by Pirelli are alphabetically listed under various classifications in this catalog. The classifications include surgical, sanitary and toilet articles; mechanical goods; sponge rubber products; sporting goods and games; household items, clothing; stationery products; and miscellaneous.

•

Facts About Work and Wages. Chamber of Commerce of the United States, Washington, D. C. 3½ x 6 in. 12 pp.

One of a series of informative pamphlets issued by the Chamber of Commerce of the United States, an organization supported by American manufacturers, this recent pamphlet gives statistics on industrial production, sources of unemployment, payrolls, etc. Such subjects as labor's share of the national income, average annual earnings, length of work week and child labor are discussed.

Editorial Comment

Tire Safety Campaign

A NUMBER of tire manufacturers have joined hands in a cooperative campaign designed primarily to stimulate tire sales by urging the motorist to replace his worn, smooth tires with new ones as a protection against blow-outs which are one of the main causes of accidents. The campaign consists of news releases to newspapers and magazines; streamers, banners, etc., for display by dealers; and two newspaper advertisements to appear in all of the leading newspapers of the country during the week of May 14 to 21 designated as "National Tire Safety Week." This is an ambitious and comprehensive plan of attack and all those who worked on the details are to be complimented on the excellent foundation they have laid for the campaign.

It is a little unfortunate, however, that the news releases put so much stress on the financial gains expected by the tire industry from this campaign. In our estimation it would have been preferable to play up only the Safety First idea in the news stories—as it is in the advertisements—for if the motorist became sold on the need for replacement the desired increase in tire sales would automatically follow. To say that the industry expected to gain financially as a result of the campaign weakened the acceptability of the news releases by both newspaper publisher and reader with the result in the case of the former that if published at all the story was more likely to appear in the financial pages than in the automobile or general news sections. It would be well to bear this point in mind if the campaign is repeated in the Fall just prior to winter driving—a step which will depend, to some extent, on the success of the present campaign.

As for the potentialities of the campaign, it is estimated that some 59,000,000 tires are due to become smooth and worn during 1938—a sizeable market. The advantages to manufacturer, distributor, dealer, as well as to the supplier of materials which go into the production of the tire, are self-evident if the campaign succeeds in arousing public interest to a point where any appreciable percentage of the nation's smooth tires are replaced.

But more important to the tire industry itself than the immediate success of the campaign is the fact that it represents the first joint effort of the industry to increase sales by promoting safety on the highways. Large and small forces have joined hands. Distributors are displaying a kindred interest. Dealers, too, are cooperating admirably.

In the past three years tire manufacturers have barred the door to price wars, to ruinous competition. Price stabilization has proved beneficial to the industry. Even the mail order firms and service station operators have caught the spirit, and with the exception of a few isolated cases, have remained in line. If the spirit now evident in the tire field were to extend to other divisions of rubber manufacturing, a far healthier and more prosperous condition would prevail throughout the rubber industry.

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A 50% Quota on Exports?

THERE is a fair possibility that the International Rubber Regulation Committee may set a 50% quota on exports of crude rubber from signatory countries for the second half of 1938 at its meeting in London at the end of this month. Reports of such a quota, which would be 10% below the 60% allowed for the second quarter of this year, are based on poor consumption figures throughout the world for the past several months.

Even if the quota was reduced to 50% for the July-December period, and even if world consumption picks up as expected, there would still be little cause for alarm insofar as world stocks are concerned. World stocks at the end of 1937 were approximately 630,000 tons. Exports of crude rubber for the first six months of 1938 will be about 470,000 tons. World consumption for this period is estimated at 425,000 tons. Thus at the half-way mark world stocks should show an increase to about 675,000 tons.

If the 50% quota is put into effect world exports in the second half of 1938 would amount to approximately 375,000 tons. If no pick-up in world consumption occurs in that period then world stocks at the end of the year would be only slightly under those at the end of 1937. If world consumption should increase, even by a respectable margin, then world stocks at the end of the year would be somewhat under 600,000 tons.

As long as world stocks hover around a 600,000 ton figure there is no cause for alarm. Should such a condition as outlined occur, then the Regulation Committee would undoubtedly increase the quota of permissible exports, and there would be sufficient time for new stocks to reach rubber manufacturing countries before any shortage of crude rubber could occur.

CURRENT • NEWS of the Rubber Industry

MAY, 1938

TIRE SAFETY WEEK PLANNED BY TRADE

Manufacturers Join in Cooperative Campaign to Stimulate Sales in Replacement Tires to be Climaxed with "National Tire Safety Week"

A cooperative campaign to promote greater safety in motor car driving and to stimulate the sale of automobile tires has been launched by the Tire Division of the Rubber Manufacturers Association. The campaign, already under way, will be climaxed by observance of "National Tire Safety Week", from May 14 to 21. The cooperative agreement was signed by representatives of the tire manufacturers at a meeting held last month in White Sulphur Springs, West Virginia.

According to A. L. Viles, president and general manager of the Rubber Manufacturers Association, the campaign is designed to replace an estimated 59,000,000 tires due to become smooth and therefore unsafe during 1938. A series of ads in more than 300 newspapers will be presented, urging motorists to "protect themselves, their families, and other drivers on the road by replacing their old, smooth tires with new ones." A special insignia for National Tire Safety Week has been devised and will be used on newspaper advertisements, banners, streamers, and other forms of advertising to be used.

59,000,000 Tires Needed

Tire executives estimate that if 59,000,000 tires were to be replaced as a result of the cooperative campaign, such replacements would result in sales of approximately $500,000,000, which is 10% of the total amount President Roosevelt has asked Congress to set aside for aiding business generally. It is pointed out that not only would the tire manufacturers, distributors and dealers profit from the large volume of replacement business, but manufacturers and suppliers of materials and equipment to the tire industry as well.

In connection with the campaign, the R.M.A. points out the fact that the tire industry has been outstandingly successful in its efforts to give more value for less money. Wholesale tire prices today are only 57.4% as high as they were in 1926, while quality and performance have been vastly improved. The cost of a tire today is only one-fourth as great as it was 25 years ago and the mileage ten times as much.

PUBLIC SAFETY
The Hand of Fate is Cruel to those who ride on SMOOTH TIRES
YOUR OLD TIRES Taken in Trade
SAVE AND BE SAFE
BE SAFE... REPLACE OLD, SMOOTH TIRES NOW!
National TIRE SAFETY WEEK

Replica of one of two ads to be used in promoting National Tire Safety Week.

It is estimated that the success of National Tire Safety Week would benefit the more than 125,000 employees of the tire manufacturers, as well as thousands of others employed in affiliated industries. Employees in the tire industry received wages and salaries in excess of $100,000,000 in 1937. The campaign represents the first joint effort of the industry to increase tire sales and safety on the highways. The following manufacturers are participating:

Cooper Corp., Corduroy Tire & Rubber Co., Dayton Rubber Mfg. Co., Firestone Tire & Rubber Co., Fisk Tire Co., General Tire & Rubber Co., B. F. Goodrich Co., Goodyear Tire & Rubber Co., Kelly-Springfield Tire Co., Lee Rubber & Tire Corp., Mansfield Tire & Rubber Co., McCreary Tire & Rubber Co., Norwalk Tire & Rubber Co., Pennsylvania Rubber Co., and U. S. Rubber Products, Inc.

Best Month for Pioneer

Pioneer Asphalt Company, Lawrenceville, Illinois, reports that the month of March was the best month in its entire history. The company has been engaged in the manufacture and sale of asphalt products to the rubber and other industries for approximately forty years.

GOODRICH WORKERS REJECT WAGE CUTS

Union Holds Secret Ballot After Avoiding Decision for Several Weeks and After Investigations Launched by Various Agencies

After a month of feverish excitement in Akron, during which charges flew thick and fast, investigations were launched, conferences held, outside interests intervened, the union tendered some concessions, and Goodrich remained adamant in its request, the Goodrich local of the United Rubber Workers of America finally held a secret ballot and by an overwhelming vote rejected the wage and hour adjustments suggested by the company if all of its present production is to be retained in the Akron factories.

Prior to the holding of the actual vote, the union postponed it several times for various reasons. Because of inaction on the part of the union, Goodrich withdrew all of the commitments it had made in negotiations with the union. These commitments, including a promise not to undertake any manufacturing operations in new locations for at least six months and one relative to new construction activities in Akron, were dependent on union acceptance of the proposed wage cuts of from 10 to 20 cents an hour, more flexible hours, and an assurance of efficient workmanship.

No Further Negotiations

At this writing (May 10), the union is attempting to renew negotiations with the Goodrich management relative to working hours and conditions, but as yet Goodrich has made no further move in this direction. Since the company stressed the point that if wages were not adjusted as requested it would be forced to make additional decentralization moves in an effort to lower production costs, such moves are expected to materialize soon.

One of the suggestions to settle all-time differences between labor and management in the rubber industry made as a result of the Goodrich difficulties was that offered by James P. Miller, regional director of the National Labor Relations Board, who suggested the establishment of an industry-wide coordination commission to handle grievances and aid in setting up uniform procedure.

NEW RUBBER ITEMS SHOWN AT TOY FAIR

A fair volume of business, slightly exceeding that of last year, was reported by rubber manufacturers participating in the 1938 American Toy Fair, held in New York City under the sponsorship of the Toy Manufacturers of the U. S. A., from April 25 to May 7. As usual, a number of manufacturers exhibited their wares at the Hotel McAlpin, while others displayed them in permanent showrooms in the city. Several new novelties were displayed by rubber manufacturers.

At the McAlpin, the Seiberling Latex Products Company had its complete line of Walt Disney characters, both molded and inflated types, on display. Included in this display were the Snow White and Seven Dwarf characters in colorfully decorated molded rubber recently introduced by the company. New novelty items featuring these characters are flat character figurettes of fully decorated rubber with stand-up bases, suitable for use as place cards. These figurettes are put up in various assortments in packages. Molded Mickey Mouse novelties were also displayed by Seiberling Latex. Don Glass was in charge of the Seiberling exhibit.

Approximately 100 molded toy items, ranging from figures of soldiers, sailors, animals, etc., to complete games featuring rubber parts, were on exhibit in the rooms of the Auburn Rubber Company. These novelties are sold in both bulk and box sets of varied assortments, such as farm figures, military items, circus figures, etc. Introduction of the games, including baseball and racing games, represents a new interest for Auburn. Also displayed were molded brick building sets of rubber, these bricks being of the interlocking type.

Other Novelties on Display

Play balls and beach balls in colorful array were shown by the Seamless Rubber Company at the McAlpin, and new numbers in play balls were to be seen in the Pennsylvania Rubber Company's rooms. Sun Rubber featured its line of popular-priced rubber dolls, play sets, teething rings, and various specialty items. The "Weaver" valve balls—including footballs, basketballs and soccer balls—were shown by the C. B. Webb Company. A wide assortment of novelty balloons were on display in the exhibit sponsored by the Lee-Tex Rubber Products Corporation. Anderson Rubber Company showed its varied lines of footballs, basketballs, sport togs, and other products.

Included among the new rubber items featured by companies at their permanent showrooms in New York was a new "Bottletot" all-rubber doll by the American Character Doll Company, described as being made of soft "Flexoflesh" rubber. Another new all-rubber doll is the "Baby Buttercup" introduced by the Regal Doll Corporation. Barr Rubber Products Company showed a number of new molded and inflated novelties first introduced at the Toy Fair.

Coming Events

May 23-25. Rubber Technology Conference, London, England.

June 3. R. I. Rubber Club, Wannamoisett Country Club, Providence, R. I.

June 11. Annual outing, New York Rubber Group, Karatsonyi's, Glenwood Landing, L. I., N. Y.

June 27 - July 1. Annual Meeting, A.S.T.M., Chalfonte-Haddon Hall, Atlantic City, N. J.

July 23. Fishing trip, L. A. Rubber Group, out of San Diego Harbor.

Aug. 19. Outing, Boston Rubber Group; site to be announced.

Sept. 5-9. Fall Meeting, American Chemical Society, Milwaukee.

Oct. 10-14. National Safety Congress, Hotel Stevens, Chicago, Ill.

Nov. 4. Boston Group, Rubber Division, A.C.S., Boston.

1937 FIGURES GIVEN BY RUBBER DIVISION

According to its survey of crude and reclaimed rubber consumed in the United States during 1937, and year-end stocks of these materials, the Leather and Rubber Division of the Bureau of Foreign & Domestic Commerce, Washington, D. C., estimates that domestic consumption of crude rubber in 1937 amounted to 543,600 tons, as compared with a figure of 542,947 previously reported by the Rubber Manufacturers Association. Inventory at the end of December 31, 1937, was 262,200 tons, according to the survey, as compared with 256,618 estimated by the Association.

The Division's estimate of 543,600 tons consumed in 1937 represents a decline of 5.5% compared with the official estimate for 1936. The data reported to the Leather and Rubber Division by members of the industry is said to have accounted for 95.5% of the amount of crude rubber available for the year and therefore it is probable that the Division's estimate is closer to the actual consumption figure. On the basis of the survey, year-end stocks may be divided between manufacturers (167,300 tons) and importers and dealers (94,900 tons).

The Division estimates that production of reclaimed rubber in the United States during 1937 amounted to 185,000 tons, consumption 162,000 tons, and inventory at the end of the year to 28,800 tons. This compares with R. M. A. estimates of 178,776 tons, 157,990 tons, and 26,260 tons, respectively. The ratio of reclaimed rubber consumption to that of crude rubber, according to the Division's estimate, was 29.8% in 1937, which compares with the R. M. A. estimate of 29.1%.

Consult RUBBER RED BOOK directory for sources of supply for machinery, chemicals, etc. $2.00 per copy.

RMA REPORT SHOWS SPONGE RUBBER GAINS

That sponge rubber products represent the fastest growing division of the rubber industry is indicated in the detailed report of the Rubber Manufacturers Association on net sales value of rubber product shipments and crude rubber consumption during 1937. Sponge rubber products showed a gain of 37% in dollar value and 33% in crude rubber consumed last year over the previous year. The dollar value for 1937 was $5,910,000 as compared with $4,297,000 in the preceding year, while 4,131 tons of rubber were consumed in comparison with 3,107 tons. The R. M. A. reports cover approximately 80% of the industry.

Although figures applying to sponge rubber products, both in value and in tonnage, are still small when compared to other uses of rubber, considerably more attention is being paid to such products with the result that appreciable gains are anticipated for 1938 over 1937. Sponge rubber is already being used for upholstery in fine furniture, bus, train and airplane cushions, and is currently being tested for use in passenger car cushions.

Sales value of all other rubber products, according to the report, showed sharp gains in 1937 over the previous year from the standpoint of value, although tonnage of rubber consumed dropped slightly. The sales value of all rubber products amounted to $670,153,000 as compared with $600,094,000 in 1936, a gain of 11.7%. Crude rubber consumption declined 3.6%, from 454,037 tons in 1936 to 437,706 tons in 1937.

Tires and tire sundries accounted for 59.5% of sales, total value being $398,235,000, as compared with $353,152,000, or 58.8% in 1936. The amount of crude rubber consumed by these products, however, declined from 349,512 tons in 1936 to 329,390 last year, the percentages for total rubber consumed being 67.9% and 75.3%, respectively. In the past four years the percentage of crude rubber going into tires and tire sundries has dropped approximately 2.5% with regard to total rubber consumed by all rubber products.

The current R. M. A. report indicates that there was a considerable increase in retreading and recapping activity during 1937, since the value of tire sundries and repair materials rose from $9,757,000 in 1936 to $11,331,000 last year, while crude rubber consumed increased from 6,701 tons to 7,559 tons. The principal items in this classification are used for retreading purposes.

Certify Union at Hood

Local 571 of the United Automobile Workers was recently certified by the National Labor Relations Board as exclusive representative of the production employees of the Arrow Battery Products Division, Hood Rubber Co., Inc., Niagara Falls, N. Y. Certification followed a public hearing on the question of exclusive representation held in Buffalo on January 6.

SEVERAL NEW TIRES SHOWN TO TRADE

Several new tires, including passenger car, bus and truck, and tractor types, have recently made their appearance on the market. Applying time-tested engineering principles incorporated in front steel wheels of farm tractors to rubber, Goodrich has introduced an entirely new type of front wheel pneumatic tire for agricultural service. Known as the "Skid-Ring," the new tire has a rubber flange extending outward approximately an inch from the center of the tire. It is said to combine all the values of both steel and rubber by using the new type of construction. A new Hi-Cleat Silvertown Farm Tractor tire for rear wheels, with many improvements, has also been developed.

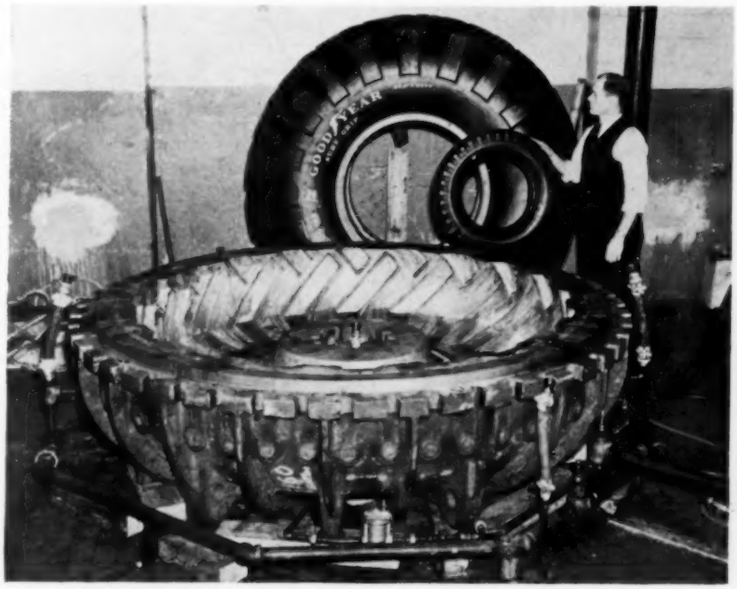
Another new Goodrich tire is a Silvertown truck and bus tire, a first line product for commercial use, built with the recently-announced "Hi-Flex" cotton cord, designed to reduce tire heat generated in high speed service. So-called artificial stretch is removed from this cord before it is built into the tire, said to result in a more compact, smaller-gauge product, which returns to its original position after being stretched. In addition, Goodrich has brought out a new line of "Super-Traction" truck tires for service where traction is a major requirement in mud, snow, or any off-the-pavement service where travel is rough. Greater depth in the tread is said to account for the super-traction qualities in this new line.

The largest heavy duty truck tire yet to make its appearance, being 24.00-32 in size and weighing 1,200 pounds, was recently introduced by Goodyear. It is being made for a manufacturer of large earth-moving vehicles. This tire has an outside diameter of 82 inches, is nearly a foot taller than the height of an average man, and has a rim diameter of 32 inches. It measures 25 inches in cross section. Tread is the standard Goodyear "Sure Grip" design used on tractor tires. Vulcanization required the use of a special mold weighing 13½ tons, the tube mold weighing 10,500 pounds. The new tire is said to weigh twice that of the largest truck tire previously built.

Firestone has introduced a complete new line of "Convoy" tires, featuring a new tread design which is said to provide an exceptional safety factor. The tread is built to fit the road and provide non-skid protection. Firestone has also introduced a new tire designed and built especially for trailer and semi-trailer equipment, the first of its kind to be developed. To resist side skid, the five-ribbed tread of this tire is contoured with a double radius, being flat in the center and flaring to the shoulders. It is offered in five sizes.

Other manufacturers have recently introduced new tires. Pharis is featuring a new line of "Roadgripper" tires with heat-resisting, low-stretch, high-break cord. General is pushing its recently-introduced Dual 8. Fisk has brought out a "75" tire. Denman is featuring a re-treadable tire for trucks, buses and passenger cars. Dayton is marketing a tire with "toe-action" tread made with heat-resistant "Daytex" cord. Several other new tires have also been developed and are expected to make their appearance shortly.

New Goodrich tires, left to right: Super-traction tire for commercial service; "Skid-Ring" pneumatic tire for front tractor wheels; Silvertown Heavy Duty Express tire.



Comparison of Goodyear's new 24.00-32 "Sure Grip" truck tire with the 6.00-16 size used on passenger cars. The giant mold is seen in the foreground.

Modifies Climax Order

An announcement of a modification of a former order in the case of the Climax Rubber Company, of Brooklyn, N. Y., has been made by the Federal Trade Commission. Under the terms of the modification, Climax is permitted to represent that its products "have antiseptic properties and combat the growth of bacteria." It may not represent that its products kill all germs and bacteria, which is not contended by the company. The modified order also permits Climax to state that its products "combat obnoxious odors developing from the fermentation or putrification of body wastes." The company makes infants' garments and other rubber sanitary and waterproof products.

Reorganize Machine Company

Following the confirmation of a plan of reorganization in proceedings under Section 77B of the Bankruptcy Act by Judge C. C. Hincks of the U. S. District Court in New Haven last month, the Automatic Machinery Manufacturing Corporation has been organized to carry out the provisions of the plan and succeeds to the business and assets of the Automatic Machine Company of Bridgeport, Conn. George L. Sexton remains as president of the reorganized company, while the Aetna Industrial Corporation of New York will act in an advisory capacity. The company makes machinery for the rubber and other industries.

CURTIS ADDRESSES THE BOSTON GROUP

A talk on "Twenty-Five Years of Rubber Compounding" by E. B. Curtis of the R. T. Vanderbilt Company, New York City, and one under the title of "Corrupt Government in Massachusetts," by L. C. Bickford, Editor-in-Chief of the Yankee Network News Service, were heard by approximately 115 members and guests at the Spring Meeting of the Boston Group, Rubber Division, A.C.S., held at the Fox and Hounds Club, in Boston, on May 6. Before the speakers were introduced James C. Walton (Boston Woven Hose and Rubber Co.) announced that the annual outing will be held on August 19, although no definite site has yet been chosen. Mr. Walton is chairman of the group's Outing Committee.

The talk of Mr. Curtis on compounding reviewed the development of the art from the simple formulae and comparatively few materials of a quarter century ago to the more complex formulae and greatly increased number of materials today. At that time, for instance, rubber thread was made up of 100 parts of rubber and 6 parts of sulfur. Today, the formula is considerably more complex, with other materials added to improve the mixing and to give additional properties to the finished product.

Symbols Designated Materials

"Even in 1914 compounding of stocks was largely experimental and the writing of formulae was surrounded with great secrecy," said Mr. Curtis, "as witness the symbols consisting of pictures and geometrical figures used in one of the large factories to designate various materials." In those days the most important material was crude rubber, of which there were two principal paras, two plantations, and about twenty other types. Reclaimed rubber was next in importance. It was made mostly from boots and shoes, followed a little later by tire and tube and mechanical reclaims. Today's reclaims are more varied in number and greatly improved in quality and processing properties.

The principal pigments in use twenty-five years ago, continued Mr. Curtis, were clay, zinc oxide, whiting, barytes, and lithopone. The chief colors used were ultramarine blue, chrome green, red iron oxide, and antimony sulfide. The softeners included pine tar, coal tar, petrolatum, mineral rubber, and rosin. Accelerators were largely of the inorganic type, such as litharge, magnesium oxide, and lime. The first organic accelerator extensively used was aniline oil which was mild, rather weak, a good softener, but being very volatile on the mills and calenders it gave off heavy clouds of very toxic vapors.

Research chemists accordingly developed thiocarbanilide which had marked advantages over aniline. Then came, hexamethylene - tetramine, a powerful accelerator which vulcanized in mold, steam or air, and proved suitable for both white and colored stocks. It bloomed badly from uncured stocks and saturated the cloth liners with hexa crystals. This bloom readily settled on the perspiring skin of the worker and an irritating rash was the general result.

The next group of accelerators to come into favor was the guanidines—DPG and TPG. The latter type was mild and slow curing, eminently suitable for accelerating thick articles such as solid tires. DPG was much more active, but was inclined to be somewhat scorchy. It was peak curing and did not give particularly good aging compounds. These were followed by the aldehyde-amines developed by Dr. Sidney Cadwell. This class had members from the mildest to the most powerful types, ranging from liquids to pastes to solids. They all gave excellent aging stocks and dominated the field for a number of years.

Introduction of the Thiazoles

Then came the thiazoles, of which mercaptobenzothiazole was the mother material. Derivatives were the disulphide, the zinc salt, and certain esters. All were characterized by fine aging and were suitable for white and colored stocks. At first the industry had some difficulty with scorching, but soon learned to use them satisfactorily. They became more popular than other types and, according to the speaker, are the most popular and largest used accelerators today throughout the world. Specialties in accelerators are the thiurams, certain salts and esters of dithiocarbamic acid, some xanthates, etc. There are over 50 accelerators listed in the rubber journals, and there are probably some 20 more in use which are not listed.

The quality of rubber products twenty-five years ago, particularly as to aging, was rather poor, but occasionally a "freak" would show up which had remained in good condition for 10 or 20 years. Cadwell noted the extraordinary aging of the accelerator ethyledine aniline. By a certain treatment he was able to remove the accelerator characteristics and the resulting product was found to be an excellent antioxidant. At about the same time, Goodrich chemists developed aldol-alpha-naphthylamine. These two antioxidants ruled the field for some time and were used in very large quantities.

Then phenyl alpha and beta naphthylamines appeared and soon gained the upper hand, dominating the field in turn until the ketone-amines were introduced. The latter are probably the largest used antioxidants today. All of these various types and their "cousins" are still being used as evidenced by the listing of 20 members in the rubber journals.

Research chemists deserve a great deal of credit, according to the speaker, for developing such fine accelerators and antioxidants, particularly does credit belong to the three large rubber companies which made these materials available to the industry rather than hold them for their own use.

Speaker Lists Developments

Mr. Curtis mentioned the development of the various tests and equipment for aging and concluded his talk by listing what he considered to be the most important improvements or highlights in compounding in the past quarter century, other than the accelerators and antioxidants mentioned, as follows, but not necessarily in the order of their importance: (1) Carbon black for reinforcing; (2) Fat acids for activation and dispersion; (3) Organic colors; (4) Soft carbon blacks and special blacks; (5) Fine particle and variable curing zinc oxides; (6) Titanium dioxides; (7) Low sulfur compounding; (8) Plasticizers for crude rubber; (9) Super aging, high heat resistance compounding; (10) Fine particle size calcium carbonate; and (11) Secondary vulcanizers.

Discussing alleged corruption in the State of Massachusetts, Mr. Bickford, a former crime reporter for the *Springfield (Mass.) News*, and one-time assistant editor of the *New York World*, dug into his knowledge of conditions in the political structure of the state. He was a forceful speaker who evidently has been in close touch with the local situation and minced no words in describing operation of certain state and city agencies. His comments brought forth many questions from the floor, indicating the great interest with which the speaker's statements were received.

Order Copies Now!

Copies of all papers delivered at the Rubber Technology Conference to be held in London, England, on May 23 to 25, will be made available in printed form. A price of £1/11/6 (approximately $7.75 at the current rate of exchange) has been set for the complete papers. A limited number of editions will be made available, and those interested in securing copies should make early application to The Secretary, Institution of the Rubber Industry, 12 Whitehall, London, S.W. 1, England.

Move Vansul Offices

The general offices of Vansul, Inc., manufacturers and distributors of colors, pigments and fillers for rubber manufacturers, have been moved from New York City to the company's plant and laboratory at 193 William Street, Englewood, N. J. The telephone number is Englewood 3-6820.

N. Y. GROUP OUTING SATURDAY, JUNE 11

Although complete details are not available at this writing it is known that the annual outing of the New York Group, Rubber Division, A.C.S., which will be held on Saturday, June 11, at Karatsonyi's, in Glenwood Landing, Long Island, N. Y., will include a number of new features and events not heretofore on the program, according to Charles Haynes, chairman of the Outing Committee. The soft ball tournament, for instance, has been eliminated, and only teams selected by various groups, such as Peddlers vs. Chemists, Single Men vs. Married Men, etc., will play. Other events will include a tug-of-war, running races, horse-shoe pitching, boccie, golf, etc. D. C. McRoberts will act as Master of Ceremonies.

Glenwood Landing is situated about 22 miles from New York and is easily reached by bridge or ferry from New York or Connecticut. It is on the North Shore of Long Island, between Roslyn and Glen Cove, and is only a few minutes drive from the end of the Northern State Parkway which in turn is a continuation of Grand Central Parkway leading directly from the new Tri-Boro Bridge. Karatsonyi's is right on the shore with complete bathing and locker facilities at hand. Accommodations include large fields for soft ball and other events, with ample parking space for cars.

Golfers will be interested to learn that the celebrated Engineers Golf Course is within one-half mile of the outing grounds and the golf tournament will be held there. The Committee urges that members reserve the date—Saturday, June 11—pending the announcement which will be sent out shortly containing full details of time, events, road map, ferry schedules, railroad schedules, cost, etc. Suggestions will be welcomed by the Chairman, Charles Haynes, c/o Binney & Smith Co., 41 East 42nd Street, New York City.

AVIATION FEATURED AT L. A. MEETING

Aviation was the main theme of the program given at the last meeting of the 1937-38 season of the Los Angeles Group, Rubber Division, A.C.S., held on May 3 at the Hotel Mayfair in Los Angeles. More than 100 members and guests attended the meeting.

H. H. Bruderlin, engineer for Douglas Aircraft, spoke on "Airplane Construction and the Use of Rubber in the Control of Vibration and Motor Noise." This talk was followed by a technical motion picture made for Douglas Aircraft showing actual operation of various parts of a modern transport plane. K. J. Kernochan, manager of aeronautical sales for Pacific Goodyear, then discussed "Power Brakes, Tires, and Other Rubber Products Used in the Aviation Industry."

The operation of an airplane was described in detail by a pilot from American Airlines. A hostess from the same transportation line spoke briefly of her work. Arthur Beggs, coast sales manager of the company, then discussed some of the air problems of the future.

The special prize of the evening, a complete poker set, was contributed by Godfrey L. Cabot, Inc., through the B. E. Dougherty Co., and the door prize, a beverage set, by the same company. Ed Royal won the latter prize. Table favors were contributed by H. M. Royal, Inc. The next indoor meeting of the group will be held in September.

Rubber "Roborboxer"

In place of the usual punching bag, German boxers are now training with a sponge rubber model of a man. It is known as the "Roborboxer", is life-size in cross-section as far as the waist, and is supported on an ingenious framework of steel tubes which causes the dummy to move backwards and forwards and thus imitate the movements of an adversary to a limited extent. It may be adjusted so as to conform to the body weight of the boxer in training.

OFFICERS ELECTED BY AKRON RUBBER GROUP

An address on the uses of rayon and the election of officers for the 1938-39 season featured a meeting of the Akron Group, Rubber Division, A.C.S., held on April 22 at the Akron City Club in Akron, Ohio. Approximately 150 members and guests attended the meeting. June 18 was tentatively set as the date for the annual outing of the group.

The newly-elected officers are A. E. Warner, of the C. P. Hall Co., as chairman; Ralph La Porte, of Seiberling Rubber Co., as vice-chairman; and H. V. Powers, of the Goodyear Tire and Rubber Co., as secretary-treasurer. The latter was re-elected to his post.

The address on rayon was delivered by W. H. Bradshaw, director of the Rayon Technical Division of E. I. du Pont de Nemours & Co., Inc. As might be expected, Mr. Bradshaw went into some detail on the new types of rayon cord which have been developed for use in tire carcasses.

R. I. Club to Meet

The next meeting of the Rhode Island Rubber Club will be held on June 3 at the Wannamoisett Country Club, Providence, R. I. A golf tournament will precede the meeting. The motion picture "Rubber Reborn," which traces the manufacture of reclaimed rubber at the East St. Louis, Ill., plant of the Midwest Rubber Reclaiming Company, will be shown, preceded by a brief address by Mr. William Welch, president of Mid-West.

CHICAGO HOLDS LAST MEETING OF SEASON

The Chicago Group, Rubber Division, A. C. S., held its last meeting of the 1937-38 season on April 29 at the Hotel Sherman in Chicago. Approximately 125 members and guests attended the meeting which was preceded by the usual dinner in the College Inn of the hotel. A special floor show presentation of "Snow White and the Seven Dwarfs" was made during dinner. O. J. Urech, of Samuel J. Bingham's Son Manufacturing Co., acted as chairman for the evening.

At the business session of the meeting, Dr. William G. Nelson, divisional manager, Product Quality Department, U. S. Rubber Products, Inc., Detroit, presented an illustrated talk on "Physical Testing of Rubber Compounds." He described the various equipment used for making tests on rubber compounds in both the cured and uncured state, as well as methods employed in testing finished rubber products, such as engine supports and dampeners. At the conclusion of this address, there was considerable discussion concerning the method of evaluating results obtained on the various machines described and on the use of new types of hardness testers.

Motion pictures describing the fishing and other recreational spots in northern Wisconsin, under the title of "The North Woods," were presented by Mr. J. Pattison of the Chicago and North Western Railway Company. Before the meeting adjourned, plans were discussed for an outing during the summer.

Completing Neoprene Plant

Construction work is reported to be almost completed on the new neoprene plant being erected at Deepwater, N. J., by the Rubber Chemicals Division of E. I. du Pont de Nemours & Co., Inc., Wilmington, Del., to replace that destroyed by explosions on January 24. The new plant is expected to be in operation by May 15 and it is said that a sufficient supply of neoprene for all purposes will be available shortly after that date. During the past few months, during which there has been a definite shortage on the product, neoprene stocks were conserved for those products where no other material could be substituted. Splendid cooperation is reported to have been received from rubber manufacturers in the furthering of this program.

Needham Plant for Sale

The complete rubber reclaiming plant of the Needham Rubber Company at Charles River, Massachusetts, has been offered for sale on the open market by the company. The available equipment includes an extruder, strainer, 40-inch mill, 600-pound mixer, air compressor, single and double gear 24-inch refiners, a Banbury, chopping and grinding machines, and other equipment. Mr. L. Fineberg is president of the company.

FINANCIAL NEWS

1937 NET OF $15,995 REPORTED BY MOHAWK

Due to a complete reorganization of its capital structure, the Mohawk Rubber Company, Akron, has been able to report a net profit of $15,995 for 1937, after all charges including plant depreciation of $88,645. This is the first year since 1929 for which the company has reported profitable operations. A loan of $130,000 made possible settlement of extended creditors' claims exceeding $651,000 and elimination of more than a half million dollars of liabilities.

According to President R. E. Bloch, the reorganization resulted in the elimination of a surplus deficit of $1,891,000 and creation of a capital surplus of $780,000. With a working capital of $386,000, the ratio of current assets to liabilities is now approximately four to one. It was also made clear that the required number of debenture holders have consented to an extension of the maturity date of $233,000 debentures to April 1, 1948, with a reduction in the rate of interest from 6 to 5 per cent.

Mohawk stockholders have approved a plan of recapitalization whereby the preferred stock has been eliminated, with owners of preferred to receive five shares of common for each share of preferred they hold, while common stockholders will receive one share of new common for each five shares of old common held. The old preferred stock amounted to 21,643 shares with $56.00 in accumulated dividends at $7.00 per year. There were 117,000 shares of old common stock outstanding. New common stock will amount to 131,000 shares. The First-Central Trust Company of Akron is acting as the exchange agent.

Monsanto Chemical Co.

March Quarter: Net profit of $583,281, or 52 cents a share on 1,114,388 common shares, after deductions for preferred dividend requirements and minority interests, as compared with $1,333,854, or $1.20 a share on 1,114,408 common shares then outstanding in the corresponding 1937 period. Because the acquisition of the Fiberloid Corporation was not effected until April 1, 1938, operations of that company are not reflected in earnings reported for the first quarter of this year.

Norwalk Tire & Rubber

Six months ending March 31: Net profit of $39,217, after all charges but before provision for Federal income taxes, which compares with a net profit of $42,917 before taxes in the corresponding period of the previous year.

Baldwin Rubber Co.

March Quarter: Net loss of $31,675, which compares with a net profit of $73,957, or 23 cents each on 316,757 shares of capital stock, in the preceding quarter, and net profit of $176,050, or 63 cents a share on 278,604 shares, in the March quarter of 1937. For the six months to March 31, the company reports a net profit of $42,282.

American Cyanamid Co.

March Quarter: Net profit of $94,077, equal to 3 cents each on 2,520,368 shares of $10-par combined Class A and B common stocks, excluding shares held by subsidiaries, after deducting $12,760 dividends accrued on preferred stock, and after research and process development expenses, amortization and minority interests, and other charges.

Hewitt Rubber Corp.

March Quarter: Net income of $10,691, equal to 6 cents a share on outstanding capital stock, after all charges and reserves, including normal Federal income and undistributed profits taxes, which compares with net earnings of $103,553, or 63 cents a share, last year. Hewitt has no funded debt or preferred stock.

Corduroy Rubber Co.

For 1937: Net income of $118,821, after $5,500 surtax, equal to 81 cents each on 29,395 common shares after dividend requirements on prior preferred and participating preferred stocks. This compares with net income of $90,695, or 23 cents each on 29,878 common shares then outstanding, in 1936.

New Jersey Zinc

March Quarter: Net profit of $652,596, equal to 33 cents each on 1,963,264 shares of $25-par capital stock, after depletion and contingencies and including $146,817 proceeds from patents. This compares with $2,169,841, or $1.10 a share, in the March quarter of 1937.

Collyer Insulated Wire

For 1937: Net income of $208,547, equal to $1.39 each on 150,000 capital shares, as compared with $178,752, or $1.19 each on 139,000 shares, in the previous year.

Aetna Rubber Co.

For 1937: Net loss of $22,888, which compares with a net loss of $10,863 reported for the previous year.

Pharis Tire & Rubber

March Quarter: Net profit of $82,845, equal to 37 cents each on 220,000 capital shares, as compared with $27,376, or 12 cents a share, last year. Gross sales amounted to $1,737,415, against $1,684,130 in the corresponding period of 1937.

Anaconda Wire & Cable

March Quarter: Net loss of $309,790, after depreciation, obsolescence and dismantlements, and Federal income taxes, contrasted with net profit of $907,254 reported for the first three months of 1937.

Thermoid Company

Year ended March 31: Net loss of $115,459, which compares with net profit of $309,085, or 41 cents a share on 458,334 common shares for the previous year. A net loss of $95,741 is reported for the quarter ended on March 31.

Gillette Rubber Co.

For 1937: Net profit of $320,336, after provision for $107,800 surtax, equal to $1.60 each on 199,762 common shares. This compares with $448,445, or $2.24 a common share, in the previous year.

General Cable Corp.

March Quarter: Net loss of $66,147, after provisions for contingencies, surtax and other charges, as contrasted with a net profit of $887,652 in the corresponding period of 1937.

Lima Cord Sole & Heel

For 1937: Net profit of $25,381, after surtax of $1,737 and all other charges, which compares with $105,676 earned in 1936.

National Foreign Trade Week

National Foreign Trade Week under the sponsorship of the Chamber of Commerce of the United States of America, and the National Foreign Trade Council, Inc., as well as numerous cooperating organizations, will be held this year from May 22 to 28. Special observances of this week, the purpose of which is twofold, *i.e.*, to direct attention to the foreign trade of the United States, and to stimulate local survey and development of foreign trade possibilities in individual cities and towns and in individual trades and industries, will be held in practically all of the larger cities in the country. Oliver C. Moles, chairman, Foreign Trade Committee, Akron Chamber of Commerce, is understood to be planning several meetings with special appeal to members of the rubber industry. Full details regarding National Foreign Trade Week can be secured from the Foreign Commerce Department of the Chamber of Commerce of the United States, Washington, D. C.

ADVERTISING PAGES REMOVED

Names in the News

O. A. HELSER, personnel manager, Pharis Tire & Rubber Co., Newark, Ohio, delivered an address on employment at the Newark Y. M. C. A. on April 8. He outlined the employee's position in the manufacture of tires.

L. M. SEIBERLING, commercial sales manager, Seiberling Rubber Co., Akron, is reported to have fully recuperated from a bullet wound caused on April 15 when a bullet ricocheted from a piece of steel sheeting during tests at the factory to determine the velocity of a gun before testing the resistance of a bullet-proof tube.

JAMES D. TEW, former president of the B. F. Goodrich Co., Akron, severed his last connection with the rubber industry on April 20 when he resigned from the directorate of that company.

HARRY F. SCHOFIELD, technical representative for the Rubber Regenerating Co., Ltd., London, for the past ten years, has been appointed to cover sales in the rubber industry for Harold Wilson & Witco, Ltd., of London. This company represents a merger of the interests of Harold Wilson and Witco, Ltd. Headquarters of the merged company are maintained at 6 Portman Mansions, Baker Street, London, W. 1, England.

JAMES WARFEL, general manager of the Sidney, Australia, plant of the Goodyear Tire & Rubber Co., is expected to arrive in the United States for a short visit some time in June. He is scheduled to sail back to Australia late in July.

BURT F. STAUFFER, general manager, Miller Division, B. F. Goodrich Co., Akron, was honored by his associates at a dinner in the Miller Cafeteria on April 11, the occasion being his completion of 45 years of service with the company. He was presented with a specially made shotgun.

FOSTER DEE SNELL, head of the consulting laboratory bearing his name in Brooklyn, N. Y., addressed the students in the chemistry and chemical engineering departments at the Polytechnic Institute of Brooklyn on April 8 on the subject of "Opportunities in Chemistry and Chemical Engineering."

L. L. SMITH, assistant treasurer, B. F. Goodrich Co., Akron, completed 30 years of service with the company last month. Eight other Goodrich employees also completed a similar record.

ERNEST T. HANDLEY, associated with Firestone Tire & Rubber Co., Akron, for a number of years, sailed aboard the *S.S. Manhattan* last month for Basle, Switzerland, where he becomes manager of the local Firestone plant.

Schnee with Rubber Division

Alexander Schnee, under assignment as clerk to commercial attache, has been working with the Leather and Rubber Division of the Bureau of Foreign and Domestic Commerce, Washington, D. C., for the past several months. He is a native of New York, a graduate of Dartmouth, and also attended the London School of Economics. Mr. Schnee prepares revision sheets for the "Rubber Tariff Manual," writes articles for "Commerce Reports" on rubber products, edits reports from foreign offices of the Department of Commerce for use by the Leather and Rubber Division, and conducts research on specific inquiries received by the Division. He collaborated in the preparation of the report on "International Trade in Balata" recently completed by the Division.

FRANCIS B. DAVIS, JR., president, U.S. Rubber Co., New York, will head the committee to solicit contributions of firms in the rubber industry in the $10,000,000 campaign of the Greater New York Fund. CYRUS CHING, industrial relations manager of the company, will be vice-chairman of the committee. A. L. VILES, president and general manager of the Rubber Manufacturers Association, will head a separate committee to solicit contributions from employee groups in the industry.

DR. HOWARD E. FRITZ, who for years headed the chemical sales division of the B. F. Goodrich Co., Akron, has been placed in charge of the newly-formed synthetic sales department of that company. He has recently devoted his entire efforts to the development and sale of Koroseal.

LARRY R. ERWIN, development department, Goodyear Tire & Rubber Co., Akron, sailed for the Argentine on April 23 to take charge of belting manufacturing development at the local Goodyear plant. He has been with Goodyear for ten years.

CHARLES M. PIPER, one-time general sales manager of the Fisk Rubber Co., and more recently engaged in industrial management work, has been named an executive of the Standard Marketing Co., Inc., 26 Broadway, New York City, a recently organized firm of marketing and merchandising representatives.

WILLIAM R. CISNEY, assistant general sales manager, A. Schrader's Son, Brooklyn, N. Y., was married to MISS DOROTHY CONWELL HOOD on March 25 in New York City. They will reside in the vicinity of New York.

CHEMISTS TO ATTEND RUBBER CONFERENCE

As this is being written a number of American chemists are leaving, or have already left, to attend the Rubber Technology Conference to be held in London, England, on May 23 to 25. Full details concerning the Conference, which is being sponsored by the Institution of the

Dr. Royce J. Noble
who will attend Rubber Conference

Rubber Industry, appeared in our March, 1938, issue. Among the chemists, several of whom have prepared papers for discussion at the Conference, are the following:

R. A. Kemp (Bell Telephone Labs.), R. P. Dinsmore (Goodyear), J. T. Blake (Simplex Wire), W. F. Busse (Goodrich), I. Drogin (J. M. Huber), W. B. Wiegand (Columbian Carbon), N. Bekkedahl and L. A. Wood (Department of Commerce), C. C. Davis (Boston Woven Hose), E. H. Krissman (DuPont), R. L. Sibley (Monsanto), Ira Williams (DuPont), and R. J. Noble (consulting technologist). Other American chemists are also planning to attend.

Several of the chemists are planning extended stays after the Conference is concluded. For instance, Dr. Noble, who has prepared a paper on "Purified Latex and Rubber" for discussion in London, will visit latex plants in England and on the Continent before returning to the United States.

WILLIAM S. RICHARDSON, merchandising manager, B. F. Goodrich Co., Akron, has been named general sales manager of the same division, succeeding the late CLARENCE E. COOK. L. H. CHENOWETH, with Goodrich since 1912 on mechanical goods sales, becomes merchandising manager.

HAROLD S. BIRKBY, formerly in charge of merchandising to the rubber, textile and paper industries for Esso Marketers, New York City, has been named sales manager of the Hodges Carpet Co.

NEW ENGLAND NEWS

Current operations of A. G. Spalding & Bros. in its Chicopee, Mass., plant show a mild seasonal rise on the strength of increased activity of the golf and tennis departments, which are largely on a 40-hour weekly schedule as compared with 30 hours in other departments. The 30-hour rate was in general effect throughout most of the first quarter. Production of the plant is divided among golf and tennis balls, golf clubs, tennis racquets and inflated goods, most of which are seasonal

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With President Charles E. Speaks and all other officers re-elected for the coming year, and a quarterly dividend of $1.50 on preferred capital stock voted in April, Fisk Rubber Corp. of Chicopee Falls, Mass., has returned 1,350 employees to work and is operating on a five-day schedule with average weekly production of about 7,500 tire units.

John F. Lynch, personnel department manager, recently expressed belief that the company has one of the lowest labor turnover records of any manufacturing establishment with more than 1,000 employees. The average term of employment among the 1,400 workers is said to be about 13 years, with several individuals on the payroll continuously since the business was started in 1898.

President Speaks has been named to the Massachusetts Industrial Promotion Committee, charged with obtaining new industries for the state, by Governor Hurley.

Armstrong Rubber Co., West Haven, reports current assets, as of December 31, 1937, of $835,125, including $86,845 cash, and current liabilities of $599,895, giving a working capital of $235,230, representing a reduction in capital as compared with last year.

Goodyear Rubber Co., Middletown, Conn., manufacturer of rubber footwear, is slowly swinging into production after its long winter shutdown, with about 200 employees on the rolls. Normal operations with 500 employees are expected by mid-summer, according to Vice-president Arthur V. McDowell.

Whitney Blake Co., Hamden, Conn., reports that net sales for 1937 were $1,795,888 against $1,441,448 in 1936. Net income for the past year was $60,169, or 60 cents a share, against a deficit of $22,691 in 1936.

The address of the Greenfield Rubber Company, which last month was reported to be erecting a new two-story factory building, is Greenfield, Massachusetts, and not Connecticut. The new plant will be located at 435 Deerfield Street.

Discusses Rubber Fenders

Although vast strides have been made by the automobile industry in the development of ingenious, practical and improved uses for rubber in motor cars, there are too many technical, design and production problems which remain to be solved before rubber fender experimentation can be undertaken seriously, according to R. C. Sanders, rubber expert for the DeSoto Division of the Chrysler Corporation, Detroit. He claims that the glib forecasters of rubber fenders "have let a good deal of wishful thinking get mixed up with the hard, practical laboratory development problems which lie ahead" before rubber can be used for fenders or other major parts now made of sheet metal. The 1938 DeSoto effectively uses between 35 and 40 pounds of rubber in 272 places, exclusive of tires and tubes, said Mr. Sanders.

Brokerage Is Dissolved

The partnership of Harriman and Keech, 11 Broadway, New York City, brokers dealing in rubber, cotton and other commodities, was dissolved on April 15. The Akron office of the firm has been taken over by Thomson and McKinnon, Wall Street brokers, and the entire personnel retained.

Manhattan Rubber Tiling

The Manhattan Rubber Manufacturing Division of Raybestos-Manhattan, Inc., Passaic, N. J., has developed a special light weight rubber mosaic tile floor covering, designed and constructed for modern railroad cars, buses, boats and airplanes. It is suitable for use as new equipment or for replacement and has permanent, solidly inlaid colors which may be obtained in designs to match interior color schemes. A dense, seamless surface, said to be sound absorbing and resilient, makes cleaning easy. The new floor covering, which is fire resistant, is made with an all-wearing surface with a canvas reinforced back.

New Seiberling Tire

Seiberling Rubber Company, Akron, has introduced a heavy duty, special service heat-vented tire for truck and bus use. Designed to increase mileage and reduce heat failures, the new tire employs a system of air vents to provide an outlet for internally generated heat. The heat in the cushion needs only to travel through 1/16th-inch to escape through these vents instead of having to travel slowly through an inch thickness of tread rubber, according to Harry P. Schrank, vice-president in charge of production.

Goodrich Conveyor Belting

New conveyor belting, featuring a cord construction which is said to give considerably longer wear than belts of the fabric-carcass type, has been introduced by the B. F. Goodrich Company, Akron, Ohio. Weftless cords, such as are used in modern heavy-duty truck tires, are used to build up the carcass of the new belt, this construction resulting in a belt carcass in which every tension member is completely surrounded and insulated with rubber to increase its ability to absorb and withstand shock. The belt is said to possess extreme transverse and longitudinal flexibility and can be used without difficulty on installations requiring heavy belts which previously gave trouble due to the belt being too stiff transversely and not troughing easily. Greater resistance to moisture and acid penetration is also secured due to the new cord construction. The new belting is available in any length, width and a number of plies. It must be spliced endless on the conveyor by means of portable electric vulcanizing equipment.

TRENTON NEWS

Fred Schluter, president, Thermoid Company, Trenton, has informed the company's employees that the management is determined "to avoid any further wage cuts for the rest of the year." The information was contained in a booklet given to each employee. "The company has suffered losses since January 1, but we hope that business will soon improve," said Mr. Schluter. "The wage cuts recently accepted by employees was a great help. The management willingly took the largest reduction. We invested our surplus in buildings and equipment to enable us to go on making more goods and thus assure our future. We spent $300,000 more than we took in. We regret having had to lay off some help."

Luzerne Rubber Co., Trenton, is making preparations to replace the warehouse it recently lost by fire at a loss of approximately $75,000, including raw materials and finished stock. In the interim, the company has leased a building.

Federal Judge Forman has issued an order approving the accounting and discharging the receiver of the Murray Rubber Company, Trenton, dependent upon the distribution of a few remaining assets. The order was issued at a hearing to show cause on the receiver's report as to why he should not be discharged and his accounting approved.

Citron & Byer, Trenton, have purchased the real estate formerly owned by the Lambertville Rubber Company, Lambertville, N. J. An effort is being made to lease it for factory purposes.

AETNA STOCKHOLDERS REJECT $135,000 OFFER

Stockholders of the Aetna Rubber Company at their annual meeting held in Cleveland on April 21 rejected an offer of $135,000 in cash for the sale of the company as a going concern. A two-thirds vote, or approximately 58,000 shares, was required to ratify the sale. Only 40,300 shares were voted for acceptance. The offer was made by Mr. H. C. Miller, of Akron, who declined to state whom he represented.

Sale of the company was recommended by the present management, headed by Mr. C. A. Heil as president. It was opposed by a committee headed by Mr. S. T. Campbell, former president of the company, who previously had declared that the stockholders' committee which had recommended the sale was "stacked." The Campbell group also insisted that the company could be profitably operated and claimed that "we are assured additional working capital is available if necessary."

Following rejection of the sale a board of five directors was elected, *i.e.*, S. T. Campbell, Robert R. Christian, Charles Mashek, M. C. Teasdale, and C. A. Heil. Mr. Heil was re-elected president and Mr. Teasdale was re-elected secretary and treasurer. The new directorate is expected to make recommendations for rehabilitating the company in the early future. It was announced at the meeting that Aetna Rubber had lost approximately $27,000 in the first quarter of this year, after allowing for depreciation. The company has lost money consistently for a number of years.

Offer Ahlbell Equipment

The modern factory of the Ahlbell Battery Container Corporation, Waukegan, Illinois, with a large stock of machinery, equipment and supplies, is being offered for sale piecemeal by the Consolidated Products Company, 15 Park Row, New York City, dealers in second hand machinery for the rubber and other industries, which recently acquired the plant. Ahlbell was in business for a number of years and produced cases for many of the popular brands of batteries. The machinery and equipment offered for sale include hydraulic presses, pumping equipment, rubber mills, conveyors, accumulators, tubers, compressors, motors, and machine shop equipment. Some finished stock and a good deal of raw material, including lime, clay, sulfur, reclaimed rubber, and various oils, are also on the block.

Approve Davis Contract

Stockholders of the United States Rubber Company, meeting in Jersey City on April 19, approved a new employment contract for F. B. Davis, Jr., chairman of the board and president of the company. Under the contract, Mr. Davis will receive $150,000 a year for the next six years and a pension of $75,000 a year after his retirement. He waived participation in U. S. Rubber's profit-sharing plan. It was revealed at the meeting that the company about broke even in the first quarter of 1938, with business volume running at an annual rate of approximately $120,000,000. A considerable increase over this rate is expected during the rest of the year, according to William de Krafft, chairman of the finance committee.

To Absorb Whitall Tatum

The Armstrong Cork Company, Lancaster, Penna., will take over the business and assets of the Whitall Tatum Company, including its three plants at Millville and Keyport, N. J., on or about June 20. It is understood that negotiations for the purchase of the business have been concluded. The purchase price was not revealed. Whitall Tatum is primarily a glass manufacturing company, but also operates a rubber manufacturing division, turning out drug sundries, stopples, and other molded goods.

LOS ANGELES

The annual deep sea fishing trip of the Los Angeles Group, Rubber Division, A.C.S., will be held on Saturday, July 23. The "*Sea Angler*," the fishing vessel with capacity for 40 fishermen used in last year's excursion, will again be used, out of San Diego Harbor. Tickets will include transportation from Los Angeles to San Diego, hotel accommodations, the fishing trip itself, etc. Ed Royal, of H. M. Royal, Inc., is promoting the trip. Motion pictures of the excursion will be taken and will be shown at the first indoor meeting of the Los Angeles Rubber Group next fall, according to present plans.

T. Kirk Hill, president, Kirkhill Rubber Company, recently sailed for a seven-week tour of the West Indies and the northern countries of South America.

The Darnell Corporation, Long Beach, is promoting a new automobile door lock which incorporates the use of rubber and which is said to be superior in principle and efficiency to other types of locks.

Oriental Hair and Felt Co., 4371 East 49th Street, has introduced fibre rugs featuring latex sizing and binding. I. Roth is manager of the company.

A new tuber, mill and 35 h.p. boiler have been installed in the plant of the Arrowhead Rubber Company at 1976 Laura Street. Carl E. Stentz, manager, reports an improvement in business.

Both Ed Royal and Bert Dougherty, factory representatives of various lines for the rubber and other industries, believe that the turning point in the current business recession has been reached. Sales volume of rubber chemicals, equipment and supplies on the coast, is reported to be equal to that experienced in the early months of the previous year.

ADVANCE MARKETING SYNTHETIC RUBBER

Announcement has just been made of the availability in the United States of the German synthetic rubber "Buna N"—now known as "Perbunan"—through Advance Solvents & Chemical Corporation, 245 Fifth Avenut, New York City. This company will act as exclusive agents for this material in this country. Although much has been published on this synthetic rubber and a large tonnage is being manufactured in Germany, no supplies have heretofore been available in the United States.

Perbunan is the oil-proof grade of Buna and, according to Advance Solvents, is particularly suitable for manufacturing oil and gasoline resistant articles, such as gasoline and oil hose, oil and abrasion resisting cable sheathing, conveyor belts, V-belts, packings, oil and gasoline resistant seals, and diaphragms. It has also been used successfully in the field of vibration absorbing motor mountings, for oil-resistant fabrics, such as printers' blankets, rubber aprons, and oil-resistant garments, and for printers' rollers, etc.

Recently, Dr. A. Koch, Buna expert for the I. G. Farbenindustrie, spent several weeks in the United States visiting various rubber companies. Advance Solvents has set up additional equipment in their rubber laboratory to enable them to handle technical inquiries and service for Perbunan.

Paper Wrapped Erasers

A line of rubber erasers in paper pencil form, for pencil, ink and typewriter use, has been developed by the Blaisdell Pencil Company, Philadelphia, Penna. A special rubber compound is made up in stick form and from that point on the process of manufacture is the same as that used in the production of any paper pencil. This new style eraser keeps the hands and paper clean. Its sharp point easily erases one or more letters without smudging the entire word, and it can be sharpened like an ordinary paper pencil. It is put up in both full length and half-length types, some with brushes attached.

Buys Andrews-Alderfer Co.

The Firestone Tire and Rubber Company has purchased the complete assets of the Andrews-Alderfer Company, manufacturers of latex thread at Akron, and will remove all manufacturing operations to its new latex plant in Fall River, Massachusetts. No purchase price was announced. Andrews-Alderfer was established about four years ago and sold its thread primarily to manufacturers of garters, girdles and similar products, located in the New England territory.

Obituaries

Clarence E. Cook

Clarence E. "Coxie" Cook, general sales manager, Mechanical Goods Division, B. F. Goodrich Company, Akron, died at the age of 58 in City Hospital, Akron, on April 16, following an illness of several months. He had entered the hospital on January 20. One of the most widely known Goodrich executives, Mr. Cook was born in Cleveland in 1880, and first worked as an office boy for a printing company in Akron. At the age of 17 he joined Goodrich as a clerk in the billing department. Later, he was associated with the old Peoples Hard Rubber Company and with the Gutta Percha Rubber Company, but rejoined Goodrich in 1905 as a field salesman in the mechanical goods department.

In 1910 Mr. Cook established mechanical goods branches for the company on the Pacific Coast. He returned to Akron in 1917 and was placed in charge of Goodrich branch operations throughout the United States. Subsequently, he was appointed director of mechanical sales, became a member of the Goodrich directorate, and acted as assistant sales manager of all departments. For many years he was active in the Rubber Manufacturers Association, serving at one time as chairman of its mechanical goods division.

Mr. Cook was a 32nd degree Mason, a member and former director of the Portage Country Club, and a member of both the Akron City Club and the Lotos Club of New York. Funeral services were held in Akron on April 20. Burial was in Lakeview Cemetery, Cleveland. Goodrich officials acted as pallbearers. He leaves a widow.

Charles T. McCarthy

Charles T. McCarthy, one of the most popular officials of the Naugatuck footwear plants of U. S. Rubber Products, Inc., died at the age of 70 on April 25, in the Waterbury (Conn.) Hospital after suffering a cerebral hemorrhage earlier in the afternoon at his home. Mr. McCarthy came to Naugatuck, Conn., in 1889 shortly after being graduated from Dartmouth at the age of 20 and entered the employ of the Goodyear Metallic Rubber Shoe Company. He was made secretary of that company in 1900. Later he served as secretary of the Goodyear India Rubber Glove Company, and in 1919 became factory manager for both companies after they had merged their activities.

He continued as factory manager and a director of the united companies until they were taken over by the U. S. Rubber Company and although he never held any title in the latter company he was regarded as one of the leaders by the people of Naugatuck. In recent years, Mr. McCarthy was recognized as a special assistant to Walter Norton, factory manager of the footwear plants, and was also concerned with industrial relations at those plants.

One of the youngest students ever to be graduated from Dartmouth, where he served as captain of the baseball team, Mr. McCarthy was a member of the Dartmouth Club of Connecticut, which on March 3 honored him at a dinner to celebrate the 50th anniversary of his graduation. His interest in civic and community projects was great. He was a charter member of the Naugatuck Chamber of Commerce and the Naugatuck Building and Loan Association, as well as one of the first members of the Naugatuck Rotary Club. He was also a director of the Risdon Manufacturing Co. and the Morris Plan Bank of Waterbury. Coin and stamp collecting were among his favorite hobbies. Funeral services were held in Naugatuck on April 28. Interment was in the family plot at Hanover, N. H. He leaves a sister.

William H. Balch

William H. Balch, president of the Faultless Rubber Company, Ashland, Ohio, died at the age of 69 as the result of a heart attack at his home, 921 Center Street, Ashland, on April 27. Born in Hamilton, Ontario, Canada, in 1868, Mr. Balch was reared and educated in that city, but became a permanent resident of Ashland shortly after his marriage in 1893. Prior to joining Faultless in 1910 as general sales manager, he was associated with the jewelry business in New York City. He remained with Faultless for 15 years, becoming a director of the company as well as sales manager, but left in 1926 to join an Ashland manufacturer of veterinary remedies and insecticides. He returned to Faultless in 1933 as a vice-president and was elected president in the following year, a post he held until his death.

Mr. Balch was a trustee of Ashland College and for a number of years served as a director of the Ashland Country Club, acting as its president in 1930. He promoted the organization of the Ashland Rotary Club and was chosen president when it received its charter in 1922. He was also largely responsible for the Boy Scout movement in Ashland and was a leader in organizing the Ashland Community Chest Association. During the World War, he served as a member of the War Industries Committee on Surgical Rubber Goods, and for several years he was closely associated with the activities of the rubber sundries division of the Rubber Manufacturers Association. Funeral services were held on April 29. Burial was in Ashland Cemetery.

Frank M. Dudley

Frank M. Dudley, vice-president and secretary of the J. H. Day Company, Cincinnati, Ohio, manufacturers of machinery for the rubber, bakery, paint and other industries, died at the age of 70 on April 14. Mr. Dudley became associated with the Day company in 1888 at the age of 21, was elected vice-president upon incorporation of the company in 1901, and assumed the additional office of secretary in 1910. Although an invalid for the past eight years he remained active in the management of the business until shortly before his death. Mr. Dudley was an ardent Kiwanis booster. He leaves a widow and two daughters.

George B. Hendrick

George B. Hendrick, president of the Rudge Printing Company, New York, and for many years advertising manager of the Fisk Rubber Company, Chicopee Falls, Mass., died at his home in Abington, Mass., recently, at the age of 58. At various times Mr. Hendrick held other important posts, including that of sales manager for W. L. Douglas Shoe Company, managing director of the Footwear Guild, Inc., and vice-president of the Consolidated Automatic Merchandising Company.

Lyndon E. Adams

Lyndon E. Adams, president of both the Anchor Packing Company, Philadelphia, and the Elkhart Rubber Works, Elkhart, Indiana, died at his winter home in Southern Pines, North Carolina, of a heart ailment at the age of 67 on April 9. Mr. Adams was a Mason and actively interested in Masonic charities. Funeral services and burial were held on April 12.

Establish Products Bureau

The Gummed Industries Association has established a certified products bureau for the determination and preservation of quality standards in sealing tape for the protection of quality manufacturers and consumers. The bureau is to be supported by subscribers and its facilities are to be available to all members. Further details may be secured from Mr. Ross A. Fife, managing director, Gummed Industries Association, 19 West 44th Street, New York City.

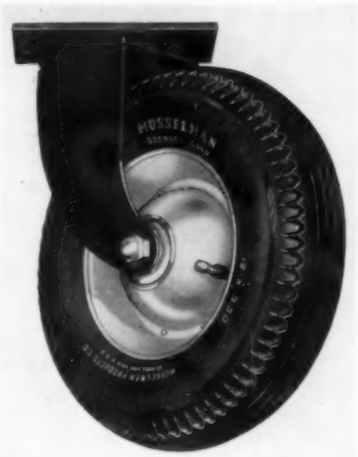
DuPont Blue CP Powder

A dry powder counterpart of the rubber dispersed Blue PCD color has been made available by the Rubber Chemicals Division of E. I. du Pont de Nemours & Co., Inc., Wilmington, Del. Designated as Blue CP Powder, it is said to be identical with the color used in Blue PCD and Blue CP paste, and to produce the same clean, brilliant, light-fast shade of blue. The new powder can be used in dry rubber mixes or in latex.

New Rubber Goods

New Doenut Caster Wheel

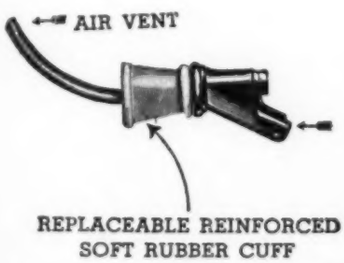
A new Doenut caster wheel, with a tire 12 inches high and 3.30 inches in diameter and a total overall height of



14 inches from floor to the top of the plate, has been announced by the Musselman Products Co., 6314 St. Clair Ave., Cleveland, Ohio. The top plate is 7 x 4 inches and operates with a ring of ball bearings for easy turning. It contains 4 bolt holes for installation. The wheel itself is of the double disc type, cadmium plated and equipped with a ⅝-inch axle and acorn axle nuts. The new wheel is engineered for loads up to 325 pounds per wheel.

Safety Carboy Drainer

A carboy drainer, consisting of an air vent, cuff and inverted spout, which fits standard size carboys from 10 to 13 gallon capacity, is being sold by the Wahlert Products Corporation, 25 Lafayette St., Brooklyn, N. Y. The air vent and inverted spout are made from hard rubber, while the cuff is made from soft rubber. The cuff, which is replaceable, allows the drainer to be attached to the carboy. Uninterrupted



flow is assured by the air vent which eliminates pumping or syphoning. The drainer is said to prevent accidents since it does away with spilling and splashing. It is also said to be resistant to most organic and inorganic acids.

Rubber Knee Pads

Knee pads made with outer surfaces of solid black rubber which is said to wear almost indefinitely, for use when wiring jobs involve a considerable amount of crawling about in roof spaces, cellars, confined quarters, etc., have been developed by the Hornby Electrical Supplies Co., Ltd., 7 Carlisle St., London, W. I., England. The outer surface is provided with a tread-like grip in order to prevent slipping on wet or treacherous surfaces. The inside of the pads is lined with sponge rubber for comfort in wearing. The knee straps are adjustable and are embedded in the rubber. The rubber also offers protection against electrical shock.

Rubber Foot Bath

Designed for use in connection with the company's fungicide for the control of athlete's foot (or ringworm), the C. B. Dolge Company, Westport, Connecticut, has introduced the Alta-Co Foot Form. Made of red rubber, in one piece, the foot form has an overall length of 12 inches. It comes equipped with a

sponge rubber insert which facilitates contact of infected skin areas with the fungicidal solution. It has suction cups on the bottom to prevent skidding. It is intended for use in wash and shower rooms to protect workers using groups of showers.

Vitalic Bicycle Tires

Under the name of Vitalic Balloon, the Continental Rubber Works, Erie, Penna., has introduced a new balloon bicycle tire which is said to wear longer because of a new heavy 2-ply cord construction and to ride easier because of a specially compounded rubber cushion between the plies. The new tire is also

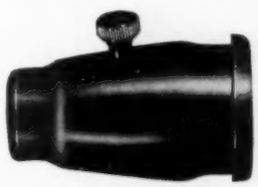
reported to be safer since it cannot slip off the rim due to a heavy 3-ply wire bead which is said to assure a perfect clinch.

Ericson Rubber Specialties

The Ericson Manufacturing Co., 5716 Euclid Avenue, Cleveland, Ohio, is currently featuring a line of rubber sockets and plug caps of unusual construction. The rubber socket is equipped with a switch and ⅜-inch bushing and was especially designed to give long uninterrupted service with all dangers from shorts and shocks eliminated. The rubber casing fits tightly around the base

Rubber Plug Cap

of the lamp preventing the entrance of any foreign material, which makes it particularly suitable for use in machine shops, foundries, etc., where metallic dust is present. The blades of the plug cap made by the company are held firmly and permanently in an unbreakable insert. The connections are on the inside

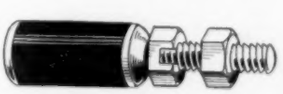


Rubber Socket

where they are protected. A flexible shank takes the wear off the cord. This cap is easy to connect and is made to fit all standard receptacles. Ericson also makes a portable lamp with a rubber handle which has a ½-inch wall to protect and insulate the heavy duty insert socket. The rubber handle is coated with a baked rubber lacquer to resist oil and acid deterioration.

Anchor Expansion Bolt

An expansion bolt, with rubber as the sole securing medium, has been developed by Craftplug, Inc., 145 East 57th St., New York City. The rubber, of the cold-rolled, non-conforming type, exerts a permanent grip on the hole in which the bolt is placed, and expands in installation when a slotted nut is turned. The bolt may be removed at any time by releasing pressure on the rubber by unscrewing the nut. The



shock absorbing qualities of the bolt are such that a safe grip will be obtained even on floors of only 1-inch concrete. Although designed for the fastening of seats in schools, theatres, etc., the bolt may be used for many other purposes.

MARKETS

RUBBER—COTTON AND FABRICS—CHEMICALS

NEW YORK, MAY 10, 1938

Crude Rubber

CRUDE rubber prices moved into higher channels on the Exchange in mid-April supported by the report of increased consumption figures for March over February, factory buying of actuals and futures, and higher cables from abroad. A wave of foreign and domestic factory buying on April 22, some of it reported from Japanese sources, brought the price up to 12.77, high for the period. Because of bearish labor news, heavy May liquidation, a declining securities market, and weaker cables from abroad, the price started a downward movement after April 22 culminating in the low for the period of 11.25 on April 30. Factory interests, a stronger stock market, firmer cables, and some commission house buying in the past ten days have resulted in a better price, reaching a 12-cent figure today (May 10). The trade is anxiously awaiting the next meeting of the International Rubber Regulation Committee scheduled for the end of this month at which permissible quotas for the second half of the year are expected to be announced. Quotations in the outside market, Exchange, London and Singapore, follow:

As of May 10

Plantations—

Ribbed Smoked Sheets—			
No. 1 Spot	—	@	.12
July-September	—	@	.12⅛
October-December	—	@	.12¼
No. 2	—	@	.11⅛
No. 3	—	@	.11⅛
No. 4	—	@	.11
Thin Latex Crepe	—	@	.13⅛
Thick Latex Crepe	—	@	.11⅞
Brown Crepe, No. 1	—	@	.11¼
Brown Crepe, No. 2	—	@	.11⅛
Amber Crepe, No. 2	—	@	.11¼
Amber Crepe, No. 3	—	@	.11⅛
Amber Crepe, No. 4	—	@	.10⅛
Brown Crepe, Rolled	—	@	.09⅝

Latex—

Normal, per lb., carload lots	.14½	@	.15

Paras—

Up-River, fine	—	@	.11¼
Acre Bolivian, fine	—	@	.11½

Balata—

Surinam sheet	—	@	.38

LONDON MARKET

Standard Smoked Sheets—Buyers—May 10			
July-September	—	@	6d
October-December	—	@	6 1/16d

SINGAPORE MARKET

Standard Smoked Sheets—Sellers—May 10			
July-September	—	@	5 23/32d
October-December	—	@	5 25/32

Reclaimed Rubber

Reclaimers report a slightly better demand in the past month. Signs of a slow but steady pick-up are seen. Consumption of reclaim in March was estimated at 8,573 tons, a gain of 1,706 tons over the 6,867 tons reported for February. There has been no change in the price structure since our last report. Current quotations follow:

Shoe

Unwashed	lb.	.07	@	.07¼
Washed	lb.	.10½	@	.10¾

Tube

No. 1 (Floating)	lb.	.14	@	.14½
No. 2 (Compounded)	lb.	.09	@	.09½
Red tube	lb.	.09	@	.09½

Tires

Black (acid process)	lb.	.07¾	@	.07½
Black, selected tires	lb.	.06¼	@	.06½
Dark Gray	lb.	.09¾	@	.10
White	lb.	.13	@	.13½
Truck, Heavy Gravity	lb.	.06	@	.06½
Truck, Light Gravity	lb.	.07½	@	.08

Miscellaneous

Mechanical blends	lb.	.04½	@	.05

Scrap Rubber

(Delivered Akron Mills)

Scrap rubber dealers report a continued dull market, with no immediate signs for an early pick-up. Prices have dropped slightly on auto tire peelings and No. 2 inner tube stocks, and increased slightly on beadless tire stock since our last report. Other prices remain unchanged. Current quotations follow:

(Prices to Consumers)

Auto tire peelings	ton	15.50	@	16.50
Mixed auto	ton	11.50	@	12.00
Beadless tires	ton	16.50	@	17.00
Clean solid truck tires	ton	23.50	@	25.00
Boots and shoes	ton	18.00	@	18.50
Arctics, untrimmed	ton	12.00	@	14.00
Inner tubes, No. 1	lb.	.08	@	.09
Inner tubes, No. 2	lb.	.03¾	@	.04
Inner tubes, Red	lb.	.03¾	@	.03⅞

Cotton

Based on mill price fixing, demand from trade quarters, and news of the Administration's plans to spend billions to advance recovery, cotton prices moved upward in mid-April, advancing from 8.66, the price quoted for middling uplands on the Exchange on April 11, the date of our last report, to a high for the current period of 9.03 on April 18. The price sagged again after that date on reports of unfavorable weather conditions in the cotton belt, poor reports from the textile trade, and lack of effective trade support. Occasional short covering and temporarily improved technical positions rallied the price from time to time, but the downward trend continued, reaching 8.57 on May 5, low for the period. The market has developed a steady tone in the face of weakness in foreign markets in the past few days, yesterday's price being 8.67. Current trade views lean toward a domestic cotton crop of 13,000,000 to 14,000,000 bales. Quotations for middling uplands on the Exchange follow:

	Apr. 11	May 10		
	Close	High	Low	Close
May	8.56	8.69	8.58	8.58
July	8.66	8.76	8.67	8.67
October	8.76	8.76	8.70	8.70

Tire Fabrics

(Prices Net at the Mill)

Peeler, carded, 23/5/3	lb.	.28¾	@	.29
Peeler, carded, 23/4/3	lb.	.29¾	@	.30
Peeler, carded, 15/3/3	lb.	.26¾	@	.27
Peeler, carded, 13/3/3	lb.	.25¾	@	.26
Egyptian, carded, 23/5/3	lb.	.41¾	@	.42
Egyptian, combed, 23/5/3	lb.	.46¾	@	.47
CHAFERS				
Carded, American, 1 1/16"	lb.	.28½	@	.28¾
Carded, American, 1"	lb.	.20	@	.24

Sheetings

48x40	36 in.	5.50	lb.	—	@	.03⅝
40x40	36 in.	6.15	lb.	—	@	.03⅜
40x36	36 in.	6.50	lb.	—	@	.03¼
48x48	40 in.	2.50	lb.	—	@	.07¼
48x48	40 in.	2.85	lb.	—	@	.06½
56x60	40 in.	3.60	lb.	—	@	.06
48x44	40 in.	3.75	lb.	—	@	.05¼
44x40	40 in.	4.25	lb.	—	@	.04⅞

Ducks

Enameling (single filling)	lb.	.21	@	.23
Belting and Hose	lb.	.25	@	—
Single filling, A grade	lb.	.09½	@	.12½
Double filling	lb.	.10½	@	.13½

Closing Rubber Prices on New York Commodity Exchange, Inc.

No. 1 Standard Contract of 10 tons

FROM APRIL 12 TO MAY 10

Date	Spot	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	Sales
Apr. 12	11.95	11.93	11.97	12.06	12.15	12.22	12.30	12.36	12.42	12.46	12.54	12.60	12.66	——	83
13	12.28	12.25	12.29	12.37	12.46	12.55	12.63	12.70	12.76	12.82	12.87	12.92	12.98	——	296
14	12.50	12.48	12.52	12.62	12.70	12.79	12.85	12.92	12.98	13.03	13.10	13.16	13.22	——	301
15	——	——	——	——	——	——	——	——	——	——	——	——	——	——	——
16	——	——	——	——	——	——	——	——	——	——	——	——	——	——	——
17	——	——	——	——	——	——	——	——	——	——	——	——	——	——	——
18	12.75	12.74	12.76	12.89	13.00	13.04	13.05	13.15	13.23	13.31	13.37	13.43	13.49	——	302
19	12.41	12.41	12.44	12.52	12.60	12.69	12.79	12.84	12.89	12.93	12.98	13.03	13.08	——	311
20	12.41	12.38	12.42	12.51	12.60	12.66	12.73	12.80	12.87	12.95	13.01	13.07	13.13	——	261
21	12.50	12.48	12.52	12.60	12.69	12.75	12.82	12.88	12.94	13.01	13.07	13.13	13.19	——	162
22	12.77	12.74	12.77	12.87	12.95	13.03	13.11	13.18	13.25	13.32	13.35	13.42	13.48	——	331
23	12.61	12.59	12.63	12.71	12.79	12.87	12.95	13.02	13.09	13.16	13.21	13.27	13.33	——	172
24	——	——	——	——	——	——	——	——	——	——	——	——	——	——	——
25	12.25	12.23	12.27	12.34	12.41	12.50	12.60	12.68	12.76	12.84	12.89	12.94	13.00	——	389
26	11.72	11.71	11.75	11.84	11.92	12.03	12.12	12.15	12.23	12.32	12.40	12.46	12.52	——	469
27	11.80	——	11.82	11.89	11.97	12.07	12.17	12.24	12.31	12.39	12.46	12.53	12.60	——	453
28	11.70	——	11.72	11.79	11.86	11.94	12.01	12.08	12.14	12.20	12.26	12.32	12.38	——	375
29	11.45	——	11.47	11.53	11.60	11.67	11.75	11.81	11.88	11.95	12.00	12.05	12.11	——	543
30	11.25	——	11.25	11.29	11.34	11.41	11.48	11.54	11.60	11.67	11.72	11.77	11.83	——	201
May 1	——	——	——	——	——	——	——	——	——	——	——	——	——	——	——
2	11.27	——	11.27	11.35	11.43	11.52	11.61	11.66	11.71	11.76	11.81	11.86	11.92	11.99	298
3	11.55	——	11.55	11.58	11.62	11.70	11.78	11.84	11.91	11.95	12.03	12.08	12.13	12.18	313
4	11.48	——	11.50	11.55	11.60	11.66	11.73	11.78	11.84	11.89	11.95	12.00	12.05	12.10	174
5	11.39	——	11.39	11.44	11.51	11.57	11.64	11.70	11.76	11.82	11.88	11.93	11.98	12.03	160
6	11.88	——	11.88	11.90	11.93	12.00	12.07	12.13	12.19	12.24	12.31	12.35	12.40	12.45	216
7	11.80	——	11.80	11.82	11.85	11.94	12.04	12.09	12.14	12.20	12.25	12.30	12.35	12.30	85
8	——	——	——	——	——	——	——	——	——	——	——	——	——	——	——
9	11.75	——	11.76	11.79	11.83	11.91	12.00	12.06	12.12	12.16	12.22	12.27	12.32	12.37	262
10	12.00	——	12.01	12.05	12.09	12.17	12.24	12.31	12.37	12.42	12.48	12.53	12.58	12.63	271

New York
May 10, 1938

Rubber CHEMICAL Markets

All Quotations
F.O.B. Works
Unless Noted

ACCELERATORS

Organic				
A-1 (Thiocarbanilid)	lb.	.26	@	—
A-5-10	lb.	.35	@	.40
A-11	lb.	.52	@	.65
A-19	lb.	.52	@	.65
A-32	lb.	.70	@	.80
A-77	lb.	.42	@	.55
A-100	lb.	.42	@	.55
A-433	lb.	.45	@	.55
Aldehyde ammonia, crystals	lb	.65	@	.70
Altax	lb.	.60	@	.70
Butyl Zimate	lb.	3.00	@	—
Captax	lb.	.50	@	.60
Crylene	lb.	.55	@	.65
paste	lb.	.45	@	.55
Di-Ortho-Tolyguanidine	lb.	.44	@	.46
Diphenylguanidine	lb.	.35	@	.36
El-Sixty	lb.	.57	@	—
Ethyl Zimate	lb.	3.00	@	—
Ethylidene aniline	lb.	.45	@	.47½
Formaldenyde aniline	lb.	.37½	@	.42
Guantal	lb.	.45	@	—
Heptene	lb.	.40	@	—
Hexamethylenetetramine	lb.	.36	@	—
Lead Oleate, No. 999	lb.	.14	@	—
Witco		.15	@	—
Lithex	lb.	.18	@	.20
Methylenedianiline	lb.	.36	@	.37
Monex	lb.	3.25	@	—
Oxynone	lb.	.64	@	.80
Phenex	lb.	.50	@	.55
Pip-Pip	lb.	2.50	@	—
Pipsolene	lb.	1.55	@	1.85
R & H 40	lb.	.40	@	.41
R & H 50	lb.	.40	@	.41
R-2	lb.	1.40	@	1.80
R-23	lb.	.40	@	—
Rotax	lb.	.60	@	.65
Satex	lb.	1.20	@	1.25
SPDX	lb.	.75	@	—
Super-Sulphur No. 1	lb.	.50	@	—
No. 2	lb.	.20	@	.50
Thiocarbanilid, drums	lb.	.24	@	.30
Trimene	lb.	.75	@	—
base	lb.	1.20	@	—
Triphenylguanidine	lb.	.58	@	.60
Tuads	lb.	3.00	@	—
Ureka	lb.	.60	@	.75
Ureka Blend B	lb.	.60	@	.75
Ureka C	lb.	.56	@	.65
Vulcanex	lb.			
Vulcone	lb.			
Vulcanol	lb.			
Z-88-P	lb.	.51	@	—
Zimate	lb.	3.00	@	—
Inorgani-				
Litharge, domestic	lb.	.06½	@	.07¾
Magnesia, calcined, heavy	lb.	.04	@	—

COLORS

Blacks (See Compounding Materials)

Blues				
Prussian	lb.	.36	@	.37
Ultramarine	lb.	.15	@	—
Browns				
Mapico	lb.	.13	@	—
Umber, Turkey	lb	.04	@	.04½
Greens				
Chrome	lb.	.21	@	—
Chromium Oxide, bbl.	lb.	.21	@	—
Guignet's Green	lb.	.70	@	—
Reds				
Antimony				
crimson, 15/17	lb.	.48	@	—
sulfur, free	lb.	.48	@	.60
Indian English	lb.	.09	@	.10
Domestic (Maroon)	lb.	.11	@	—
Red oxide, pure	lb.	.10	@	.12
Rub-Er-Red, f.o.b. Easton	lb.	.09¼	@	—
Whites				
Cryptone, No. 19	lb.	.05⅞	@	.06½
Cryptone CB, No. 21	lb.	.05⅞	@	.06½
Cryptone, ZS-20	lb.	.09	@	.09¼
Cryptone, ZS-86	lb.	.09	@	.09½
Lithopone				
Albalith, black label—11	lb.	.04⅜	@	.04⅝
Azolith	lb.	.04⅜	@	.04⅝
Ray-bar	lb.	.05⅞	@	.06⅜
Ray-cal	lb.	.05⅞	@	.06⅜
Rayox	lb.	.16	@	.19
Titanox A	lb.	.16	@	.16¾
Titanox B	lb.	.05⅞	@	.06⅛
Titanox C	lb.	.05⅞	@	.06⅛
Zinc Oxide—American Process				
American Azo:				
ZZZ (lead free)	lb.	.06¼	@	.06½
Anaconda, lead free	lb.	.06¼	@	.06½
Horsehead Lead Free Brand:				
Special—3	lb.	.06¼	@	.06½
XX Red—4	lb.	.06¼	@	.06½
XX Red—72	lb.	.06¼	@	.06½
XX Red—78	lb.	.06¼	@	.06½
XX Red—103	lb.	.06½	@	.06¾
Kadox, black label—15	lb.	.06½	@	.06¾
Blue label—16	lb.	.06½	@	.06¾
Red label—17	lb.	.06½	@	.06¾
St. Joe, black label	lb.	.06	@	.06¼
green label	lb.	.06	@	.06¼
red label	lb.	.06	@	.06¼
U S. P.—7, bbls.	lb.	.09	@	.09¼
Zinc Oxide—French Process				
Florence White seal—7 bbls.	lb.	.08½	@	.08¾
Green seal—8	lb.	.08	@	.08¼
Red seal—9	lb.	.07½	@	.07¾
Yellows				
Cadmolith	lb.	.50	@	.55
Chrome	lb.	.14½	@	.15½
Mapico	lb.	.09½	@	—

BLACKS

Arrow "Aerfloted" Specification	lb.	.027	@	.036
Bone, powdered	lb.	.05½	@	.12½
Carbon, compressed	lb.	.0435	@	.0775
uncompressed	lb.	.0435	@	.0775
"Certified"	lb.	—	@	—
Spherons	lb.	—	@	—
"Disperso"	lb.	.027	@	.036
Drop, bbls.	lb.	.05½	@	.14
"Excello," compressed	lb.	.0435	@	.0775
"Fumonex"	lb.	.03	@	.07
"Gastex"	lb.	.03	@	.07
Lampblack	lb.	.07	@	.12
"Micronex"	lb.	.027	@	.036
"Supreme"	lb.	.0435	@	.0775
Thermatomic—"P 33"	lb.	.04¾	@	.07¾
"Thermax"	lb.	.02½	@	.05½
United "Dixie" & "Kosmos"	lb.	.027	@	.036

COMPOUNDING MATERIALS

Aluminum Flake	ton.	21.85	@	24.50
Ammonia carbonate, lump	lb.	.10½	@	.12
Asbestine	ton	13.00	@	15.00
Barium carbonate (98-100%)	ton	—	@	—
Barium Dust	lb.	.05	@	.06
Barytes	ton	23.65	@	31.15
Basofor	lb.	.04½	@	—
Bentonite	lb.	.02	@	.03
Blanc fixe dry f.o.b. works	ton	60.00	@	65.00
Calcene	ton	37.50	@	45.00
Cataipo (fact.)	lb.	.02	@	—
Chalk, precipitated				
Suprex white, extra lt.	ton	45.40	@	60.00
heavy	ton	45.00	@	55.00
Clay, Kaolin, domestic	ton	7.50	@	15.00
Aerfloted, Suprex	ton	9.50	@	21.00
Congaree	ton	9.50	@	—
Crown (f.o.b. plant)	ton	9.50	@	—
Dixie	ton	11.00	@	30.00
Dixie, Jr.	ton	9.50	@	29.00
McNamee	ton	9.50	@	22.00
Par	ton	9.50	@	22.00
Witco	ton	9.50	@	—
Cotton Flock	lb.	.11	@	.15
Glues, extra white	lb.	.28	@	.30
medium white	lb.	.14	@	19
Kalite No. 1	ton	24.00	@	50.00
Kalite No. 3	ton	34.00	@	60.00
"Lime Crest" Industrial Filler No. 100	lb.	—	@	—
Magnesium carbonate	lb.	.07½	@	—
Mica	ton	35.00	@	44.00
Pyrax A	ton	7.50	@	20.00
Rottenstone (powdered)	lb.	.02½	@	.05
Soapstone, powdered	ton	16.00	@	22.00
Starch, powdered	cwt.	2.90	@	4.10
Talc, domestic	ton	17.00	@	20.00
Whiting, commercial	ton	17.00	@	18.00
Columbia Filler	ton	9.00	@	14.00
English Cliffstone	ton	33.00	@	43.00
Witco	ton	7.00	@	—
Wood Flour	ton	20.00	@	25.00
Zinc Carbonate	lb.	—	@	.10¾
Zinc Stearate	lb.	—	@	.27

MINERAL RUBBER

285°-300° Mineral Rubber	ton	22.00	@	42.00
Black Diamond	ton	27.00	@	—
Genasco, solid (factory)	ton	25.00	@	27.00
Hard Hydrocarbon	ton	22.00	@	42.00
Parmr, solid	ton	25.00	@	—
Pioneer, MR, solid	ton			
Pioneer-granulated	ton			

MISCELLANEOUS

Aromatics—Rodo #0	lb.	3.50	@	4.00
Rodo #10	lb.	4.50	@	5.00
Curodex 19	lb.	2.75	@	—
Curodex 188	lb.	3.50	@	—
Curodex 198	lb.	4.50	@	—
Para-Dors No. 3145	lb.	2.00	@	—
Aresklene No. 375 (dispersing, wetting and penetrating agent)	lb.	.40	@	—
Darvan (dispersing agent)	lb.	.30	@	.50
Santomerse (dispensing, wetting, penetrating and stabilizing agent)	lb.	.13	@	—
Sunproof	lb.	.35	@	.37½
Sponge Paste	lb.	—	@	.80
Tackol (tackifier)	lb.	.115	@	—
Tonox	lb.	.56	@	.60

SOFTENERS

Acids				
Acetic, 28%, bbls.	100 lb.	2.53	@	2.78
Nitric, 36 degrees	cwt.	3.00	@	6.00
Sulfuric, 66 degrees	ton	15.50	@	16.50
Acids, Fatty				
Laurex	lb.	.15	@	.16
Stearex Beads	lb.	.10¾	@	.11¾
Stearic, double pressed	lb.	.12½	@	.13½
Stearite	lb.	.10½	@	.11¾
Alkalies				
Caustic Soda, 76%	cwt.	3.15	@	3.80
Soda Ash, 58%, C.L.	cwt.	—	@	2.35
Oils				
Cycline Oil	gal.	.20	@	—
Degras, bbls.	lb.	.07¾	@	.08
Fluxrite	lb.	.05½	@	.06½
Palm Niger	lb.	.05½	@	.06½
Para-Flux	gal.	.17	@	—
Petrolatum, light	lb.	.03½	@	.03⅝
Pigmentaroil, tank cars	gal.	.16	@	—
in drums	gal.	.22½	@	.23½
Pine, steam distilled	gal.	.64	@	.69
dest. dist., drums	gal.	.49	@	.50
Rosin Oil, cmpd.	gal.	.40	@	—
Rubberol, f.o.b. Chicago	lb.	.13½	@	.14
Rubtack	lb.	.08	@	.10
Seedine, c.l.	lb.	.07¼	@	—
Tackol	lb.	.08½	@	.18
Witco Palm Oil	lb.	.07	@	—
Witco Softener No. 20	gal.	.20	@	—
Woburn No. 8, c.l.	lb.	.06	@	—
Wobonite, c.l.	lb.	.05	@	—
Resins and Pitches				
Pitch, Burgundy	lb.	.05½	@	.06½
coal tar	ton	19.00	@	22.00
hardwood	ton	16.00	@	22.50
pine, 200 lb. gr. wt.	bbl.	6.00	@	6.50
Pigmentar, tank cars	gal.	.16	@	—
in drums	gal.	.22½	@	.23½
R. S. L. Resin	lb.	—	@	—
Retort Pine Tar, drums	ton	20.00	@	26.00
Solvents				
Acetone, pure	lb.	—	@	.06¼
Alcohol, denatured, methanol, No. 1 bbls.	gal.	.33	@	.39
Benzene, 90%	gal.	.18	@	.23
Beta-Trichlorethane	gal.	—	@	.20
Bondogen	lb.	.98	@	1.65
Carbon, bisulfide	lb.	.05¼	@	.08
Carbon tetrachloride	lb.	.05¾	@	.08¾
Dichlorethylene	lb.	—	@	.25
Dipentene, cml., drums	gal.	.41	@	.50
Dryolene (f.o.b. Okla.)	gal.	.10	@	.10½
Ethylene dichloride	lb.	.05½	@	.06½
Plastogen	lb.	.07¾	@	.12½
Reogen (drums)	lb.	.11½	@	.20
Rub-Sol (f.o.b. Okla.)	gal.	.09	@	—
Trichlorethylene	lb.	—	@	.09½
Turpentine, spirits	gal.	.43	@	.47
dest. dist., drums	gal.	.33	@	.41
Waxes				
Beeswax, white	lb.	.39	@	.45
Carnauba, yellow	lb.	.46	@	.47½
Ceresin, white, dom.	lb.	.08	@	.11
Montan, crude	lb.	.10¾	@	.11¾
Paraffin (c.l.—f.o.b. N. Y.)				
Yellow crude scale	lb.	.02¾	@	—
White crude scale 124/126	lb.	.02¾	@	.03
Refined, 122/127	lb.	.04½	@	—

ANTI-OXIDANTS

Agerite Alba	lb.	1.50	@	2.10
Exel	lb.	1.00	@	1.40
Gel	lb.	.57	@	.77
Hipar	lb.	.65	@	.92
Powder	lb.	.52	@	.73
Resin	lb.	.52	@	.73
Resin D	lb.	.52	@	.73
White	lb.	1.25	@	1.75
Albasan	lb.	.70	@	.75
Antox	lb.			
B-L-E	lb.	.57	@	.60
Flectol H	lb.	.54	@	—
Flectol White	lb.	1.00	@	—
Flectol B	lb.	.54	@	—
Neozone	lb.			
Oxynone	lb.	.68	@	—
Perflectol	lb.	.67	@	.75
Retardex	lb.	.35	@	.40
Santoflex A	lb.	—	@	—
Santoflex B	lb.	.54	@	—
Stanilite	lb.	.57	@	.62
Stanilite Alba	lb.	.70	@	.75
VGB	lb.	.55	@	.60

MOLD LUBRICANTS

Aresklene	lb.	—	@	—
Cocoa Soapstock	lb.	.06	@	.08
Dipex	lb.	.06	@	.08
Lubrex	lb.	.25	@	.30
Mold Paste	lb.	.18	@	—
Rubberol, f.o.b. Chicago	lb.	.13½	@	.14
Rusco, f.o.b. Nitro	lb.	.25	@	.30
Sericite, f.o.b. N. Y.	ton	65.00	@	—
Soap Tree Bark, cut, sifted	lb.	.06	@	.08

FACTICE OR RUBBER SUBSTITUTES

Amberex	lb.	.19	@	—
Black	lb.	.07	@	.13½
White	lb.	.085	@	.15¼
Brown	lb.	.085	@	.14
Neophax	lb.	.11	@	—

VULCANIZING INGREDIENTS

Dispersed Sulfur No. 2	lb.	.07½	@	.15
Sulfur Chloride, yellow (drs.)	lb.	.04	@	—
Sulfur flour.				
Refined, 100% pure (bags)	cwt.	2.55	@	3.65
Commercial (bags)	cwt.	1.60	@	2.35
Telloy	lb.	2.00	@	—
Vandex	lb.	2.00	@	—

Crude Rubber
Latex and Guayule
Reclaimed Rubber
Tires and Tubes

STATISTICS OF THE INDUSTRY

Rim Production
Automobiles
Gasoline
Cotton Prices

U. S. Imports and Exports of Crude Rubber

YEARS	Gross Imports: Long Tons	Gross Imports: Total Declared Value	Gross Imports: Average Declared Value per pound Cents	Re-exports: Long Tons	Re-exports: Total Declared Value	Re-exports: Average Declared Value per pound Cents	Net Imports: Long Tons
1922	301,076	101,843,188	15.10	4,809	1,921,828	17.84	296,267
1923	309,362	185,060,304	26.71	8,772	5,672,319	28.87	300,590
1924	325,899	173,367,272	23.75	10,309	6,057,637	26.23	315,590
1925	393,370	426,167,504	48.36	14,827	19,847,753	59.76	378,543
1926	409,944	501,131,064	54.57	17,671	22,470,583	56.77	392,273
1927	424,733	338,688,492	35.60	27,775	24,735,488	39.76	396,958
1928	432,633	242,727,423	25.05	32,159	18,128,761	25.17	400,474
1929	560,082	239,177,811	19.06	36,485	16,868,718	20.64	523,597
1930	482,083	139,133,048	12.88	30,205	9,310,205	13.76	451,878
1931	497,176	72,922,845	6.55	25,595	4,255,572	7.42	471,581
1932	409,556	31,936,459	3.48	20,930	2,015,612	4.30	388,626
1933	407,817	44,034,064	4.82	20,537	2,601,352	5.65	387,280
1934	449,513	97,929,676	9.73	23,848	5,770,109	10.80	425,665
1935	453,134	115,299,448	11.36	11,389	3,084,331	12.09	441,745
1936	467,064	152,072,496	14.54	12,581	4,488,223	15.93	454,483
1937	574,600	237,307,041	18.44	7,902	3,385,433	19.02	566,698
1937:							
Feb.	42,743	16,470,867	17.20	523	236,853	20.21	42,220
Mar.	38,682	16,030,267	18.50	1,146	522,931	20.37	37,536
Apr.	41,427*	17,859,223	19.31	1,050	415,484	17.66	40,377*
May	46,902	22,163,440	21.10	528	270,499	21.08	46,374
June	47,073	22,559,545	21.39	807	390,542	21.60	46,266
July	41,493	19,010,273	20.45	767	300,301	17.48	40,726
Aug.	48,020	20,595,314	19.15	670	265,298	17.69	47,350
Sept.	55,123	22 119,248	17.91	668	280,741	18.76	54,455
Oct.	51,171	20,250,893	17.67	450	172,466	17.13	50,721
Nov.	51,958	19,905,523	17.01	159	66,501	18.72	51,799
Dec.	68,006	24,934,206	16.37	290	91,764	14.14	67,716
1938:							
Jan.	43,984	15,115,732	15.34	325	118,514	16.27	43,659
Feb.	39,380	13,095,429	14.85	305	109,756	16.08	39,075
Mar.	41,592	13,494,654	14.48	646	198,865	13.74	40,946

* Revised.

Note: "Gross Imports" do not include latex or guayule. To secure more accurate figures for "Net Imports" latex and guayule figures (shown below) should be added and the re-export figure deducted from the total. Annual figures for 1922, however, include both latex and guayule; guayule only is included in 1923. Annual figures for 1922-36 were revised in February, 1937.

United States Imports of Guayule, Balata, Jelutong, Liquid Latex

(All Quantities in Long Tons)

	Guayule Tons	Guayule Dollars	Balata Tons	Balata Dollars	Jelutong Tons	Jelutong Dollars	Liquid Latex (1) Tons	Liquid Latex (1) Dollars
1924	1,356	536,392	464	568,456	6,165	1,237,100	2,157	864,059
1925	3,781	1,803,448	517	574,750	6,749	1,642,531	3,272	3,537,510
1926	4,305	2,562,096	354	327,213	7,263	3,127,757	3,394	4,686,743
1927	5,018	2,674,957	582	477,246	7,785	2,448,657	1,495	1,170,650
1928	3,077	1,755,685	731	430,855	7,552	2,540,059	4,007	2,121,786
1929	1,275	545,175	728	566,964	8,204	2,458,126	3,729	1,788,391
1930	1,096	347,388	502	422,684	5,907	1,403,244	4,458	1,508,786
1931	....	.....	1,207	411,380	5,777	1,019,010	4,675	888,909
1932	....	.....	707	147,403	4,607	616,596	5,112	601,999
1933	....	.....	1,659	2,261,869	5,990	944,895	11,085	1,833,671
1934	398	75,349	1,054	438,209	4,987	943,752	13,107	3,643,221
1935	459	86,835	615	188,384	5,644	1,063,126	13,553	3,782,222
1936	1,229	286,552	535	199,368	6,163	1,296,364	19,852	6,659,899
1937	2,694	745,873	354	151,344	7,109	2,017,786	23,185	10,213,670
1937:								
Feb.	206	56,807	14	5,838	242	61,741	1,973	775,202
Mar.	136	37,453	29	13,949	898	187,413	2,216	968,053
Apr.	190	52,361	3	1,457	617	135,412	1,633	724,757
May	182	50,093	75	33,881	642	145,618	1,995	941,235
June	147	39,941	91	41,481	488	135,468	2,561	1,253,370
July	371	106,360	22	9,363	533	158,998	1,921	924,127
Aug.	335	95,893	16	5,876	363	107,611	1,801	838,778
Sept.	329	90,822	5	2,196	701	214,511	1,901	839,159
Oct.	247	68,178	29	12,090	460	149,516	1,958	844,205
Nov.	251	69,452	29	9,374	593	194,889	2,085	875,074
Dec.	140	34,347	31	11,491	1,325	470,553	1,804	694,164
1938:								
Jan.	538	147,685	23	8,958	598	224,443	1,400	494,242
Feb.	218	60,097	33	11,393	892	355,080	1,684	560,883
Mar.	150	41,518	69	19,454	587	239,271	979	327,844

(1) Weight given in pounds of dry rubber contained in latex.

Note: Annual figures for 1924-1936 revised on basis of information received on February 8, 1937.

U. S. Consumption of Crude Rubber

(Rubber Manufacturers' Association statistics raised to 100 per cent—All figures in long tons)
(All Quantities in Long Tons)

	1931	1932	1933	1934*	1935*	1936*	1937	1938
	Figures on Monthly Basis							
Jan.	28,557	29,648	22,645*	39,190	46,636	48,631	50,818*	29,429
Feb.	28,797	31,821	21,392*	40,515	42,720	36,841	51,887*	23,868
Mar.	32,788	29,505	17,483*	47,003	42,153	42,813	54,064	30,487
Apr.	33,321	27,518	25,928	44,853	44,247	52,031	51,797	
May	37,817	30,957	44,074	42,918	41,101	50,612	51,733	
June	37,916	41,475	50,743*	40,147	36,156	52,772	51,798	
July	31,397	29,976	49,614*	32,553	35,917	48,250	43,650	
Aug.	27,586	23,721	44,428*	33,216	38,775	46,777	41,456	
Sept.	23,638	23,847	35,281*	30,258	37,086	46,449	43,893	
Oct.	22,277	22,286	31,543*	31,253	41,969	49,637	38,707	
Nov.	22,943	23,231	28,831*	34,748	42,310	50,433	33,984	
Dec.	21,409	18,015	28,757*	36,569	42,474	49,754	29,160	
Tt.	348,986	332,000	400,719*	453,223	491,544	575,000	542,947	

* Revised.

Note: Figures for 1936 were revised on May 15, 1937, and are now based on Department of Commerce survey figures.

Reclaimed Rubber in the United States

(All Quantities in Long Tons)

Year	Production	Consumption Tons	Consumption % to Crude	Stocks[a]	Year	Production	Consumption Tons	Consumption % to Crude	Stocks[a]
1928	208,516	223,000	50.4	24,785	1933	99,560	81,602	19.9	20,746
1929	218,954	226,588	48.4	27,464	1934	110,010	100,597	22.2	23,079
1930	157,967	153,497	40.8	22,000	1935	122,948	113,078*	23.0*	25,069
1931	133,351	124,126	33.9	19,257	1936	150,571	141,486*	24.6*	19,000*
1932	75,608	77,504	23.4	16,354	1937	178,776	157,990	29.1	26,260
			Figures on Monthly Basis						
1937:									
Jan.*	15,129	14,450	28.4	18,822	July	16,241*	12,128*	27.8*	17,682*
Feb.*	15,192	14,578	28.1	18,490	Aug.	16,543*	13,227*	31.9*	19,706*
Mar.*	14,462	15,601	28.9	16,450	Sept.	16,410	13,681	37.4	21,597
Apr.	13,884	15,607	30.1	14,046	Oct.	15,849	12,234	31.6	23,572
May	15,793	14,693	28.4	14,647	Nov.	12,406	9,703	28.6	24,620
June	16,052	14,414	27.8	14,535	Dec.	10,815	7,674	26.3	26,260
1938:									
Jan.	8,467	6,673	22.7	27,179	July	.....	.....	...	.....
Feb.	6,012	6,867	28.8	26,431	Aug.	.....	.....	...	.....
Mar.	6,669	8,573	27.1	24,401	Sept.	.....	.....	...	.....
Apr.	.....	.....	...	.....	Oct.	.....	.....	...	.....
May	.....	.....	...	.....	Nov.	.....	.....	...	.....
June	.....	.....	...	.....	Dec.	.....	.....	...	.....

[a] Stocks on hand at the end of month or year.
* Revised.

Note: Figures for 1936 were revised on June 1, 1937, and are now based on Department of Commerce survey figures.

U. S. Consumption of Gasoline

(Bureau of Mines Statistics)
(In Thousands of Barrels of 42 Gallons)

	1936*	1937	1938		1936*	1937	1938
January	32,344	33,696	35,176	August	46,061	49,597	
February	27,178	32,000	31,861	September	44,366	47,245	
March	35,864	40,561	41,259	October	44,163	45,361	
April	38,864	43,409		November	39,954	42,666	
May	42,010	45,484		December	39,590	39,457	
June	44,522	48,580					
July	46,865	50,704*		Total	481,606	518,760	

* Revised.

Rims Inspected and Passed in U. S.

(Tire and Rim Association Reports)

	Total		Total		Total
1926	24,199,524	1930	17,364,096	1934	12,255,118
1927	19,700,003	1931	11,253,800	1935	18,664,356
1928	24,247,282	1932	6,261,336	1936	20,790,192
1929	24,141,502	1933	8,713,962	1937	22,257,964

1938		1938		1938	
January ...	527,899	May	.....	September .	.....
February ..	477,600	June	.....	October ...	.....
March	854,031	July	.....	November ..	.....
April	970,545	August	.....	December ..	.....

Daily Spot Closing Prices of Ribbed Smoked Sheet Rubber—*New York Market, in Cents per Pound*

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	Ave.
1936																																
February	15⅞	—	15⅞	15⅞	15⅝	15⅞	15⅞	15⅞	—	15⅝	15⅞	15⅛	15⅛	15⅛	15¾	15⅝	15⅝	15⅝	15⅞	15⅞	15⅝	—	—	15⅝	15⅝	15⅞	15⅞	15⅝	—	—	—	15½
March	15⅝	15⅝	15¾	15¾	15¾	15⅝	15⅝	—	15⅝	16	15⅝	15⅝	15⅝	16	15⅝	16	16	16	16	16	16	16	16	16	16	15⅝	15⅝	15⅝	15⅝	15⅝	15⅝	15 7/16
April	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	16	16	16	15⅞	16	16	16⅛	16⅛	16⅛	16⅛	16⅛	—	16⅛	16	16	16	16	16	16	16	15⅞	15⅞	15⅞	—	16
May	15⅛	15⅛	15¾	15⅛	15¾	15⅛	15⅛	15⅝	15⅝	15⅝	15⅝	15⅝	15¾	15⅝	15⅝	15¾	15¾	15⅝	15⅝	15⅝	15⅝	15⅝	15⅝	15⅝	15⅝	15⅝	15⅝	15⅝	15⅝	15⅝	—	15⅝
June	15⅜	15⅜	15⅜	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛
July	15⅞	15⅞	15⅞	15⅞	15⅞	15⅞	15⅞	15⅞	15⅞	15⅞	15⅞	15⅞	15⅞	15⅞	15⅞	15⅞	15⅞	15⅞	15⅞	15⅞	15⅞	15⅞	15⅞	15⅞	15⅞	15⅞	15⅞	15⅞	15⅞	15⅞	15⅞	15⅞
Aug.	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛
Sept.	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛
Oct.	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛
Nov.	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛
Dec.	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛
1937																																
Jan.	21⅛	—	21⅛	20⅞	20⅞	21⅞	21⅞	21⅛	22⅛	21½	22⅝	22⅛	22	21⅛	21⅛	21⅜	21⅜	21⅛	20⅛	21⅛	20⅛	21⅛	20⅝	21⅛	21⅛	21⅛	21⅛	21⅛	21⅛	21⅛	—	21⅜
Feb.	21⅞	21⅞	21⅛	21⅛	21½	21⅞	21⅞	21⅞	21⅞	23½	21⅞	23⅛	23⅜	23⅞	23⅞	23⅞	23⅞	23⅞	23⅞	23⅞	23⅞	23⅞	23⅞	23⅞	23⅞	23⅞	23⅞	23⅞	23⅞	23⅞	23⅞	23⅞
Mar.	26⅜	26⅜	26⅜	26⅜	23½	24⅞	24⅞	24⅞	24⅞	24⅞	23⅞	23⅞	23⅞	24⅞	24⅞	24⅞	24⅞	24⅞	24⅞	24⅞	24⅞	24⅞	24⅞	24⅞	24⅞	24⅞	24⅞	24⅞	24⅞	24⅞	24⅞	24⅞
April	21⅛	21⅛	21⅛	21⅛	23½	21⅛	21⅛	22½	21½	21½	21⅝	21½	20⅞	22⅝	22⅝	22⅝	22⅝	22⅝	20⅛	20⅛	20⅛	20⅛	20⅛	20⅛	20⅛	20⅛	20⅛	20⅛	20⅛	20⅛	20⅛	20⅛
May	20⅞	20⅞	19⅞	21⅛	21½	—	19⅛	18½	18½	19⅛	18⅝	18⅛	19	19⅝	19⅝	19⅝	19⅝	19⅝	19⅝	19⅝	19⅝	19⅝	19⅝	19⅝	19⅝	19⅝	19⅝	19⅝	19⅝	19⅝	19⅝	19⅝
June	19⅞	19⅞	19⅞	19⅛	—	18⅛	18⅛	19⅛	18⅛	18⅛	18⅛	18⅛	18⅛	18⅛	18⅛	18⅛	18⅛	18⅛	18⅛	18⅛	18⅛	18⅛	18⅛	18⅛	18⅛	18⅛	18⅛	18⅛	18⅛	18⅛	18⅛	18⅛
July	18⅛	18⅛	18⅛	18⅛	18⅛	19⅛	19⅛	19⅛	19⅛	19⅛	19⅛	19⅛	18⅞	18⅞	18⅞	18⅞	18⅞	18⅞	18⅞	18⅞	18⅞	18⅞	18⅞	18⅞	18⅞	18⅞	18⅞	18⅞	18⅞	18⅞	18⅞	18⅞
Aug.	18⅛	18⅛	18⅛	17⅝	17⅝	17⅝	17⅝	17⅝	17⅝	17⅝	17⅝	17⅝	17⅝	17⅝	17⅝	17⅝	17⅝	17⅝	17⅝	17⅝	17⅝	17⅝	17⅝	17⅝	17⅝	17⅝	17⅝	17⅝	17⅝	17⅝	17⅝	17⅝
Sept.	18⅛	18⅛	18⅛	17⅝	17⅝	17⅝	17⅝	17⅝	17⅝	17⅝	17⅝	17⅝	17⅝	17⅝	17⅝	17⅝	17⅝	17⅝	17⅝	17⅝	17⅝	17⅝	17⅝	17⅝	17⅝	17⅝	17⅝	17⅝	17⅝	17⅝	17⅝	17⅝
Oct.	17⅝	17⅝	17⅝	17⅝	17⅝	17⅝	17⅝	17⅝	17⅝	17⅝	17⅝	17⅝	17⅝	17⅝	17⅝	17⅝	17⅝	17⅝	17⅝	17⅝	17⅝	17⅝	17⅝	17⅝	17⅝	17⅝	17⅝	17⅝	17⅝	17⅝	17⅝	17⅝
Nov.	17⅝	17⅝	17⅝	17⅝	17⅝	17⅝	17⅝	17⅝	17⅝	17⅝	17⅝	17⅝	17⅝	17⅝	17⅝	17⅝	17⅝	17⅝	17⅝	17⅝	17⅝	17⅝	17⅝	17⅝	17⅝	17⅝	17⅝	17⅝	17⅝	17⅝	17⅝	17⅝
Dec.	18½	18½	18½	19	—	—	19⅛	19⅛	19⅛	19⅛	19	19	—	19⅛	19⅛	19⅛	19⅛	19⅛	19⅛	19⅛	19⅛	19⅛	19⅛	19⅛	19⅛	19⅛	19⅛	19⅛	19⅛	19⅛	19⅛	19⅛
1938																																
Jan.	14⅛	—	14⅛	14⅛	14⅛	14⅛	14⅛	14⅛	14⅛	14⅛	14⅛	14⅛	14⅛	14⅛	14⅛	14⅛	14⅛	14⅛	14⅛	14⅛	14⅛	14⅛	14⅛	14⅛	14⅛	14⅛	14⅛	14⅛	14⅛	14⅛	—	14⅛
Feb.	14⅞	14⅞	14⅞	14⅞	14⅞	14⅞	14⅞	14⅞	14⅞	14⅞	14⅞	14⅞	14⅞	14⅞	14⅞	14⅞	14⅞	14⅞	14⅞	14⅞	14⅞	14⅞	14⅞	14⅞	14⅞	14⅞	14⅞	14⅞	14⅞	14⅞	14⅞	14⅞
Mar.	14⅛	14⅛	14⅛	14⅛	14⅛	14⅛	14⅛	14⅛	14⅛	14⅛	14⅛	14⅛	14⅛	14⅛	14⅛	14⅛	14⅛	14⅛	14⅛	14⅛	14⅛	14⅛	14⅛	14⅛	14⅛	14⅛	14⅛	14⅛	14⅛	14⅛	14⅛	14⅛
April	10⅞	10⅞	10⅞	10⅞	10⅞	10⅞	10⅞	10⅞	10⅞	10⅞	10⅞	10⅞	10⅞	10⅞	10⅞	10⅞	10⅞	10⅞	10⅞	10⅞	10⅞	10⅞	10⅞	10⅞	10⅞	10⅞	10⅞	10⅞	10⅞	10⅞	10⅞	10⅞
May	11⅞	11⅞	11⅞	11⅞	11⅞	11⅞	11⅞	11⅞	11⅞	12	11⅞	11⅞	11⅞	11⅞	11⅞	11⅞	11⅞	11⅞	11⅞	11⅞	11⅞	11⅞	11⅞	11⅞	11⅞	11⅞	11⅞	11⅞	11⅞	11⅞	11⅞	11⅞

Average Spot Closing Prices—Ribbed Smoked Sheets

(New York Market)

Average Price per Pound for Years 1911-1930

Year	Cents	Year	Cents	Year	Cents	Year	Cents	Year	Cents
1911	141.30	1915	65.85	1919	48.70	1923	29.45	1927	37.72
1912	121.60	1916	72.50	1920	36.30	1924	26.20	1928	22.48
1913	82.04	1917	72.23	1921	16.36	1925	72.46	1929	20.55
1914	65.33	1918	60.15	1922	17.50	1926	48.50	1930	11.98

Average Monthly Price per Pound Since 1930

	1931 Cents	1932 Cents	1933 Cents	1934 Cents	1935 Cents	1936 Cents	1937 Cents	1938 Cents
Jan.	8.34	4.38	3.08	9.32	13.10	14.35	21.37	14.63
Feb.	7.70	4.03	2.95	10.45	12.92	15.48	21.33	14.71
Mar.	7.71	3.35	3.01	11.01	11.51	15.89	24.09	13.55
Apr.	6.43	3.02	3.56	12.10	11.55	15.98	23.44	11.84
May	6.49	3.09	4.95	13.26	12.05	15.62	21.14	
June	6.35	2.66	6.15	13.51	12.57	15.85	19.29	
July	6.37	2.89	8.01	14.60	12.10	16.49	18.86	
Aug.	5.38	3.63	7.31	15.47	11.98	16.25	18.37	
Sept.	5.08	3.84	7.30	15.36	11.55	16.46	18.55	
Oct.	4.87	3.65	7.64	13.96	12.62	16.55	16.28	
Nov.	4.65	3.44	8.66	13.04	13.15	17.97	14.60	
Dec.	4.64	3.24	8.87	12.98	13.28	20.01	15.41	
Average for Year	6.17	3.49	5.96	12.92	12.37	16.41	19.39	

London Closing Prices of Ribbed Smoked Sheets

(In Pence Per Pound)

Day	1938 Feb.	1938 Mar.	1938 Apr.	1938 May	Day	1938 Feb.	1938 Mar.	1938 Apr.	1938 May
1	7	7 1/8	5 7/16	—	17	7	6 7/8	—	
2	7	7 1/8	5 3/8	5 7/16	18	7 1/16	6 11/16	—	
3	6 7/8	7 1/16	—	5 3/8	19	7 1/16	6 3/4	6 7/16	
4	6 7/8	7 1/16	5 1/2	5 3/8	20	—	—	6 1/8	
5	6 7/8	7	5 7/16	5 5/8	21	7 1/8	6 11/16	6 1/8	
6	—	—	5 7/16	5 11/16	22	7 1/16	6 7/8	6 7/16	
7	6 11/16	7	5 7/16	5 3/4	23	7 1/16	6 7/8	6 1/4	
8	6 7/8	6 15/16	5 3/4	—	24	7 1/16	6 15/16	—	
9	6 15/16	6 15/16	5 7/8	5 5/8	25	7 1/16	6 7/16	5 11/16	
10	7	6 15/16	—	5 7/16	26	7 1/16	6 7/16	5 11/16	
11	6 15/16	6 7/8	5 3/4		27	—	—	5 11/16	
12	6 15/16	6 3/4	5 3/4		28	7 1/16	6 1/16	5 3/4	
13	—	—	5 15/16		29	—	5 3/4	5 1/2	
14	6 15/16	6 15/16	5 7/16		30	—	5 7/16	5 7/16	
15	6 15/16	6 7/8	—		31	—	5 7/16	—	
16	7	6 7/8	—						

Average Monthly Price Per Pound

Month	1935 Pence	1936 Pence	1937 Pence	1938 Pence	Month	1935 Pence	1936 Pence	1937 Pence	1938 Pence
Jan.	6.434	6.758	10.378	7.077	Aug.	5.696	7.581	8.830	
Feb.	6.292	7.255	10.503	7.029	Sept.	5.508	7.577	8.935	
Mar.	5.745	7.450	11.766	6.590	Oct.	6.130	7.898	7.855	
Apr.	5.604	7.502	11.471	5.793	Nov.	6.308	8.572	7.080	
May	5.822	7.335	10.250		Dec.	6.340	9.580	7.332	
June	6.027	7.352	9.548		Average for Year	5.976	7.713	9.424	
July	5.801	7.696	9.136						

Spot Closing Cotton Prices

(Middling Upland Grade—New York Market)

Recent Daily Price Per Pound

Date	1938 Mar.	1938 Apr.	1938 May	Date	1938 Mar.	1938 Apr.	1938 May	Date	1938 Mar.	1938 Apr.	1938 May
1	9.16	8.63	—	11	9.02	8.66		22	8.66	8.96	
2	9.24	8.72	8.67	12	8.99	8.77		23	8.67	8.94	
3	9.27	—	8.65	13	—	8.71		24	8.67	—	
4	9.12	8.63	8.63	14	8.94	8.98		25	8.73	8.85	
5	9.20	8.59	8.57	15	8.98	—		26	8.78	8.78	
6	—	8.53	8.70	16	8.99	—		27	—	8.90	
7	9.16	8.44	8.67	17	8.95	—		28	8.79	8.81	
8	9.12	8.57	—	18	8.60	9.03		29	8.61	8.76	
9	9.16	8.64	8.67	19	8.82	8.88		30	8.61	8.78	
10	9.11	—	8.67	20	—	8.84		31	8.69	—	
				21	8.73	8.94					

Average Monthly Price Per Pound

	1935 Cents	1936 Cents	1937 Cents	1938 Cents		1935 Cents	1936 Cents	1937 Cents	1938 Cents
Jan.	12.70	11.91	13.06	8.57	Aug.	11.48	12.28	10.41	
Feb.	12.58	11.53	13.15	8.91	Sept.	10.80	12.31	9.02	
Mar.	11.63	11.43	14.46	8.92	Oct.	11.28	12.30	8.42	
Apr.	11.73	11.71	14.23	8.76	Nov.	12.01	12.23	7.96	
May	12.25	11.68	13.34		Dec.	11.99	12.83	8.26	
June	11.89	12.02	12.70		Average for Year	11.88	12.11	11.44	
July	12.26	13.11	12.26						

World Stocks of Crude Rubber

(All figures are in long tons)

ON HAND OR AFLOAT TO THE U. S.

End of	ON HAND 1936*	ON HAND 1937	ON HAND 1938	AFLOAT 1936	AFLOAT 1937	AFLOAT 1938	ON HAND AND AFLOAT 1936*	ON HAND AND AFLOAT 1937	ON HAND AND AFLOAT 1938
Jan.	285,054	204,201*	269,078	43,870	55,096	57,356	328,924	259.297*	326,434
Feb.	282,902	195,080*	288,883	46,532	53,538	47,459	329,434	248,618*	336,342
Mar.	276,823	191,928*	294,024	58,935	56,994	41,882	335,758	248,922*	335,906
Apr.	277,478	174,934		47,678	72,530		325,156	247,464	
May	262,415	172,985		48,860	58,542		311,275	231,527	
June	245,544	169,646		47,228	57,215		292,782	226,861	
July	235,850	164,445		60,343	75,779		296,193	240,224	
Aug.	230,167	171,052		63,597	80,439		293,764	251,491	
Sept.	233,336	182,556		62,240	83,288		295,576	265,844	
Oct.	224,000	195,685		67,825	80,653		291,825	276,338	
Nov.	211,480	217,586		73,691	81,302		285,171	298,888	
Dec.	223,000	256,618		56,567	63,099		279,567	319,717	

(Rubber Manufacturers' Association figures raised to 100%)

* Revised.

STOCKS IN GREAT BRITAIN

(No. of Tons in Wharves and Warehouses, not including Latex)

At end of	London 1936	London 1937	London 1938	Liverpool 1936	Liverpool 1937	Liverpool 1938
January	84,791	29,005	40,203	77,188	41,895	21,711
February	79,757	26,508	46,596	77,138	37,078	24,737
March	74,779	21,292	50,233	72,823	30,622	26,220
April	68,932	21,128		71,388	27,443	
May	61,349	21,351		69,150	25,081	
June	55,993	21,964		66,173	21,258	
July	49,575	22,589		63,715	19,424	
August	45,749	25,211		62,367	19,817	
September	44,364	28,462		59,485	21,190	
October	40,777	30,465		55,738	21,327	
November	37,495	33,304		51,184	21,399	
December	33,027	35,633		45,291	21,978	

(Figures from the Rubber Trade Association of London)

STOCKS IN OTHER CENTRES

(Figures from Statistical Bulletin of the Int'l Rubber Regulation Committee)

	Penang and Singapore [1]	Malaya [2]	Ceylon [2]	Holland	Para and Manaos
At end of 1937					
April	38,812	38,443	3,745	101	3,840
May	34,234	40,253	3,781	94	3,559*
June	45,085	48,545	4,558	98	1,019
July	44,759	43,270	3,725	124	1,050
August	47,873*	44,775	4,454	144	1,133
September	49,438*	38,131	5,294	135	1,543
October	41,948*	43,900	4,743	117	1,780
November	38,778	45,854	5,378	105	2,901
December	44,792*	45,734	5,632	100	1,771*
At end of 1938					
January	48,494*	49,643	5,976	131	2,024
February	46,241	47,990	5,653	169	2,342

[1] Dealers' and Port Stocks. [2] Inside Regulated Areas. [3] Dealers' Stocks Only.
* Revised.

RUBBER STOCKS AFLOAT

End of:	Afloat for United States	Afloat for Europe	All Other * Afloat	Total * Afloat
1937				
January	55,096	24,920	17,984	98,000
February	53,538	27,250	13,212	94,000
March	56,994	31,240	36,766	125,000
April	72,530	34,410	17,060	124,000
May	58,542	31,500	26,958	117,000
June	57,215	34,700	33,085	125,000
July	75,779	45,100	23,121	144,000
August	80,439	40,300	19,261	140,000
September	83,288	37,400	20,312	141,000
October	80,653	35,000	19,347	135,000
November	81,302	39,100	6,598	127,000
December	63,099	45,100	26,801	135,000
1938				
January	57,356	40,500	15,644	113,000
February	47,459	41,000	19,541	108,000
March	51,143	40,000	17,857	109,000

* *Total Afloat* is an arbitrary estimate based on 1½ months' shipments as adopted by the Department of Commerce. *All Other Afloat* is determined by subtracting the amount of stocks in transit to the United States and Europe from the estimated total.
P—Preliminary estimate

TOTAL WORLD STOCKS

(Figures from the Survey of Current Business)

At end of	1933	1934	1935	1936*	1937	1938
January	634,797	661,948	698,153	600,479	454,249*	551,632*
February	626,227	663,308	686,195	599,355	445,265*	569,242*
March	638,428	666,382	678,809	583,318	447,856*	591,968
April	629,159	658,796	677,006	567,172	428,249*	
May	626,537	689,239	677,569	541,871	413,134*	
June	613,055	672,804	671,525	520,255	434,250*	
July	618,258	676,200	679,061	519,074	445,782	
August	617,449	674,702	680,644	500,520	457,462*	
September	623,683	694,361	661,509	493,585	470,768*	
October	636,597	680,616	655,000	486,159	479,398*	
November	642,968	684,408	617,300*	466,491	493,266*	
December	654,890	705,975	613,987*	466,576	545,533*	
Monthly Avge.	630,171	677,395	666,397*	528,738	460,022*	

* Revised.

U. S. Tire and Tube Statistics[1]

(All Figures Represent Thousands)

AUTOMOBILE CASINGS

Quarter	Production Figures on Quarterly Basis 1931	1932	1933	1934	1935	1936	1937	1938
Jan.-Mar.	12,323	11,004	6,635	13,437	13,355	11,798	16,142	7,714
Apr.-June	16,295	12,980	14,412	13,565	12,597	15,443	16,421	
July-Sept.	12,004	9,245	14,707	9,822	11,312	15,467	12,659	
Oct.-Dec.	8,117	6,856	9,550	10,406	12,099	15,409	10,063	
Total	48,739	40,085	45,304	47,230	49,363	58,117	55,285	

Quarter	Shipment Figures on Quarterly Basis 1931	1932	1933	1934	1935	1936	1937	1938
Jan.-Mar.	11,268	8,760	6,981	10,730	11,154	10,944	14,667	7,716
Apr.-June	15,919	18,021	15,139	14,998	13,473	16,530	16,324	
July-Sept.	14,354	8,141	13,707	11,648	13,489	14,558	13,591	
Oct.-Dec.	8,510	5,329	8,265	9,310	12,066	13,331	10,864	
Total	50,051	40,251	44,092	46,686	50,182	55,363	55,446	

Quarter	Inventory Figures [2] 1931	1932	1933	1934	1935	1936	1937	1938
Jan.-Mar	10,014	9,878	7,290	11,651	11,675	9,087	12,488	10,808
Apr.-June	10,447	4,999	6,615	10,219	10,755	7,835	12,529	
July-Sept.	8,158	6,096	7,595	8,419	8,288	9,012	11,615	
Oct.-Dec.	7,775	7,644	8,888	9,455	8,196	11,114	10,767	

Figures for Recent Months

	PRODUCTION 1936	1937	1938	SHIPMENTS 1936	1937	1938	INVENTORY [2] 1936	1937	1938
Jan.	4,579	4,980	2,743	3,875	4,509	2,490	8,917	11,377	10,988
Feb.	3,579	5,246	2,212	3,212	4,371	2,349	9,265	12,308	10,833
Mar.	3,640	5,916	2,759	3,857	5,787	2,878	9,087	12,448	10,808

AUTOMOBILE INNER TUBES

Quarter	Production Figures on Quarterly Basis 1931	1932	1933	1934	1935	1936	1937	1938
Jan.-Mar.	11,989	10,721	6,230	12,823	12,553	11,935	15,714	6,938
Apr.-June	15,388	11,913	13,001	13,191	11,631	14,678	15,299	
July-Sept.	12,839	8,286	14,356	10,321	11,270	15,377	11,949	
Oct.-Dec.	8,117	5,970	9,000	9,891	12,425	15,257	9,024	
Total	48,333	36,890	42,587	46,226	47,879	57,247	51,986	

Quarter	Shipment Figures on Quarterly Basis 1931	1932	1933	1934	1935	1936	1937	1938
Jan.-Mar.	11,251	8,918	6,539	10,640	11,252	11,410	14,498	6,969
Apr.-June	15,314	16,271	13,292	14,553	11,928	15,169	15,381	
July-Sept.	15,282	7,761	13,370	11,545	13,251	15,125	12,805	
Oct.-Dec.	8,174	4,961	8,189	8,306	11,636	12,921	9,693	
Total	50,021	37,911	41,390	45,044	48,067	54,625	52,377	

Quarter	Inventory Figures [2] 1931	1932	1933	1934	1935	1936	1937	1938
Jan.-Mar.	10,475	9,448	6,369	10,244	10,406	8,692	11,904	10,093
Apr.-June	10,504	5,174	6,097	8,795	10,050	8,105	11,746	
July-Sept.	8,095	5,753	7,008	7,639	7,565	8,627	11,242	
Oct.-Dec.	7,922	6,749	7,815	9,180	8,231	10,985	10,235	

Figures for Recent Months

	PRODUCTION 1936	1937	1938	SHIPMENTS 1936	1937	1938	INVENTORY [2] 1936	1937	1938
Jan.	4,592	4,801	2,388	4,168	4,391	2,342	8,623	11,100	10,198
Feb.	3,556	5,091	2,105	3,446	4,536	2,107	8,699	11,734	10,161
Mar.	3,787	5,823	2,444	3,796	5,570	2,520	8,692	11,904	10,093

[1] Based on reports received from the Rubber Manufacturers Association.
[2] Held by manufacturers at end of period indicated.

Automobile Production

	United States Total	Passenger Cars	Trucks	Canada Total	Passenger Cars	Trucks	Grand Total
1928	4,357,384	3,826,613	530,771	242,382	196,737	45,645	4,599,944
1929	5,358,420	4,587,400	771,020	263,295	207,498	55,797	5,621,715
1930	3,355,986	2,814,452	540,534	154,192	125,442	28,750	3,510,178
1931	2,389,730	1,973,090	416,640	82,621	63,477	19,144	2,472,351
1932	1,370,678	1,135,493	235,187	60,816	50,718	10,098	1,431,494
1933*	1,920,057	1,573,512	346,545	65,924	53,855	12,069	1,992,126
1934*	2,753,111	2,177,919	575,192	116,852	92,647	24,205	2,869,963
1935*	3,946,934	3,252,244	694,690	172,877	135,562	37,315	4,119,811
1936*	4,454,115	3,669,528	784,587	162,159	128,369	33,790	4,616,274
1937*	4,808,974	3,915,889	893,085	207,000	152,631	54,369	5,015,974
1937*							
July	438,968	360,400	78,568	17,941	12,513	5,428	456,909
Aug.	394,330	311,456	82,874	10,742	5,814	4,928	405,072
Sept.	171,213	118,671	52,542	4,417	1,926	2,491	175,630
Oct.	329,876	298,662	31,214	8,103	7,378	725	337,979
Nov.	360,055	295,328	64,727	16,574	13,793	2,781	376,629
Dec.	326,234	244,385	81,849	20,652	14,384	6,268	346,886
1938							
Jan.*	210,120	156,062	54,058	17,624	13,385	4,239	227,744
Feb.	186,806	139,519	47,287	16,066	11,753	4,313	202,872
Mar.	221,951	174,151	47,800	16,802	12,276	4,526	238,753

* Revised.
Note: U. S. figures represent factory sales; Canadian figures represent production.

Exports of Crude Rubber from Principal Producing Countries

(Long Tons)

	BRITISH MALAYA [1]								DUTCH EAST INDIES [6]							
	Gross Exports	Imports	Gross Exports Minus Imports	Ceylon [2]	India & Burma [3]	Sarawak [4]	British North Borneo [5]	Siam [6]	Java & Madura	Sumatra E. Coast	Other D.E.I.	Indo-China [6]	Amazon Valley	All Other [6]	World Total [7]
1923	252,016	70,432	181,584	39,971	6,416	5,705	4,237	1,718	32,930	46,344	57,822	5,067	16,765	7,856	406,415
1924	259,706	108,524	151,182	39,997	7,697	6,699	4,621	2,962	42,446	54,497	80,347	6,688	23,165	9,065	429,366
1925	316,825	158,022	158,803	49,566	10,082	5,424	5,377	5,377	46,757	65,499	120,626	7,881	25,298	13,797	514,487
1926	391,328	151,243	240,085	58,962	9,874	9,155	6,079	4,027	52,186	71,413	121,231	8,203	24,298	16,017	621,530
1927	371,322	182,845	188,477	55,356	11,321	10,923	6,582	5,472	55,297	77,815	142,171	8,645	28,782	15,633	606,474
1928	409,430	149,787	259,643	57,267	10,790	10,087	6,698	4,813	58,848	82,511	121,770	9,548	21,129	10,690	653,794
1929	574,836	163,092	411,744	81,584	11,663	11,077	7,381	5,018	65,990	87,789	134,037	9,696	21,148	6,767	853,894
1930	547,043	133,876	413,167	76,970	10,782	10,309	6,781	4,251	69,755	79,396	115,254	7,665	14,260	5,651	814,241
1931	519,740	125,506	394,234	61,769	8,470	10,451	6,247	4,218	75,952	87,747	116,009	11,696	12,121	3,292	792,203
1932	478,252	92,539	385,713	48,973	3,888	6,960	4,664	3,451	61,312	79,837	85,871	13,883	6,450	1,816	702,818
1933	573,412	167,377	406,035	63,351	4,527	10,874	7,555	7,765	73,851	91,861	149,659	18,394	9,883	2,737	846,312
1934	677,361	211,803	465,558	79,746	10,492	17,233	11,103	17,545	87,400	112,058	175,470	20,170	8,903	2,985	1,008,663
1935	590,319	174,652	415,667	54,316	13,968	19,465	8,885	28,327	57,488	78,325	139,297	28,816	11,275	8,745	864,574
1936	520,286	167,799	352,487	49,692	14,724	21,243	8,177	33,702	61,307	84,577	152,205	40,782	14,193	11,466	845,431
1937	681,638	213,446	468,192	70,353	17,015	25,922	13,213	35,551	83,978	125,969	208,699	43,387	15,576	12,721	1,120,576
1936:															
Nov.	47,342	16,923	30,419	4,960	1,322	1,950	701	2,260	5,398	7,109	16,718	3,872	1,592	1,163	77,464
Dec.	38,714	9,758	28,956	4,377	1,844		506	2,988	6,472	10,129	9,536	8,450	1,721	1,087	76,072
1937:															
Jan.	41,571	16,956	24,615	4,514	1,066	4,015	1,234	3,849	5,136	7,962	13,067	2,823	1,271	943	70,495
Feb.	38,058	14,048	24,010	5,603	1,876	2,015	790	3,554	5,484	7,616	12,486	3,081	1,692	929	69,136
Mar.	59,568	19,579	39,989	7,049	2,034	1,425	1,239	3,873	7,856	11,817	19,903	3,160	1,749	872	100,966
Apr.	58,718	17,136	41,582	3,419	1,186	2,960	783	1,899	6,999	8,916	15,944	2,098	1,522	962	88,270
May	51,152	17,350	33,802	4,607	1,007	742	778	2,238	7,530	8,939	20,835	2,888	1,063	1,010	85,439
June	54,809	23,614	31,195	5,149	1,092	1,890	813	2,933	8,269	12,290	24,804	3,673	762	945	93,815
July	71,863	26,100	45,763	6,279	966	2,543	1,414	3,175	7,512	11,557	23,520	5,563	854	1,416	110,562
Aug.	64,525	21,395	43,130	7,308	605	1,624	1,189	2,999	6,785	11,563	21,014	2,277	1,248	1,283	101,025
Sept.	67,414	19,065	48,349	5,804	1,092	2,659	969	3,173	6,402	10,862	19,611	4,131	1,007	1,145	105,204
Oct.	59,319	11,858	47,461	6,701	1,248	523	1,505	2,352	6,587	12,172	14,188	3,753	1,434	1,147	99,071
Nov.	57,850	12,396	45,454	4,391	2,135	2,517	1,327	2,549	6,310	10,003	11,596	4,556	963	1,037	92,838
Dec.	56,791	13,949	42,842	9,529	2,708	3,009	1,172	2,957	9,108	12,272	11,731	5,384	2,011	1,032	103,755
1938:															
Jan.	47,986	17,078	30,908	5,013	1,379	3,485	1,307	2,897	4,476	9,283	12,501	6,086	878	1,400*	79,613
Feb.	48,899	11,874	37,025	5,199	1,423	8	918	3,266	6,391	8,793	12,023	3,068	1,542	1,400*	81,056
Mar.	49,197	15,813	33,384	3,803	1,247	1,564	853	2,837	5,668	10,156	15,284	3,213	1,000*	1,200*	80,209
Apr.	53,864	9,158	44,706												

(1) Malayan net exports cannot be taken as production, since imported rubber is largely wet native rubber, which is reduced about one-third in weight by remilling; rubber exported as latex is not included which on a basis of 3½ pounds per gallon amounted to 115 tons in 1923, 1,117 in 1924, 3,618 in 1925, 3,263 in 1926, 2,439 in 1927, 1,437 in 1928, 2,670 in 1929, and 1,274 in 1930. (2) Ceylon Chamber of Commerce statistics until 1926; rubber exported as latex is not included—such shipments were equivalent to 18 tons in 1923, 93 tons in 1924, 6 tons in 1925, 20 tons in 1926, about ½ ton in 1927, and 1 ton in 1928, and practically none in 1929, 1930 and 1931. (3) Official statistics. (4) Imports into Singapore and Penang. (5) Exports from "Other D.E.I." are chiefly wet native rubber, which is reduced about one-third in weight by remilling; rubber exported as latex is not included which on a basis of 3½ pounds per gallon amounted to 2,342 tons in 1923, 1,008 tons in 1924, 2,239 tons in 1925, 44 tons in 1926, 84 tons in 1927, 1,459 tons in 1928, 1,302 tons in 1929, and 2,656 tons in 1930. (6) Calculated from official import statistics of principal consuming countries, viz., United States, United Kingdom, France, Germany, Belgium and Netherlands, and includes guayule rubber. (7) This total includes the third column for British Malaya, "Gross Exports minus Imports," and all the figures shown for the other territories. * Figure is provisional; final figure will be shown when available.

NOTE: ANNUAL FIGURES ARE MORE ACCURATE; THEY ARE REVISED AT THE END OF THE FOLLOWING YEAR.

Net Imports of Crude Rubber into Principal Manufacturing Countries

(Long Tons)

	United States [1]	United Kingdom	France (h)	Germany	Canada (ac)	Japan (da)	Italy	Russia (ce)	Australia (cd)	Belgium (d)	Netherlands	Scandinavia (abcdf)	Spain (g)	Czechoslovakia (abcd)	World Total
1919	238,407	42,671	17,685	5,584	6,395	9,753	9,894	75	1,002	3,995	2,771	3,149	2,418	9	343,808
1920	249,530	56,844	13,885	11,890	11,746	5,297	6,123	62	1,815	3,840	5,510	2,292	2,008	567	371,409
1921	179,736	42,087	15,135	21,920	8,124	21,713	3,906	165	1,014	1,705	1,022	1,279	2,245	569	300,620
1922	296,594	11,724	24,352	27,546	9,207	15,934	6,430	2,493	2,643	172	—3,807	1,778	589	567	396,222
1923	301,527	12,700	27,392	18,519	13,277	15,372	8,489	2,986	1,649	2,184	792	2,528	630	1,128	409,173
1924	319,103	—11,550	30,446	22,727	14,299	19,571	8,764	2,346	3,124	2,688	—807	3,178	944	1,370	416,203
1925	385,596	4,061	32,956	33,937	19,683	11,117	11,412	7,088	4,757	2,930	875	3,149	1,155	1,558	520,274
1926	399,981	84,865	34,240	22,775	20,229	18,125	9,809	6,529	9,021	2,498	2,670	4,046	1,299	1,870	617,957
1927	403,472	60,249	34,271	38,892	26,405	20,521	11,381	12,018	9,490	6,482	636	4,224	2,055	2,672	632,768
1928	407,572	4,846	36,498	37,855	30,447	25,621	12,433	15,134	8,430	7,958	2,243	4,418	3,178	3,138	599,771
1929	528,608	122,675	55,093	49,275	35,453	34,284	17,169	11,774	15,886	9,445	3,022	6,440	864	4,650	894,638
1930	458,036	120,069	68,503	45,488	28,793	33,039	18,639	16,387	5,354	10,635	2,924	7,710	2,400	4,468	822,445
1931	475,993	86,170	46,466	39,688	25,261	43,483	10,149	30,671	7,649	11,009	2,220	6,360	2,605	7,717	794,641
1932	393,844	44,086	42,506	45,121	20,917	56,027	14,469	30,637	12,576	9,519	2,851	7,262	4,359	9,444	693,618
1933	398,365	73,335	61,953	54,120	19,332	66,831	19,341	29,830	13,534	11,166	1,243	7,831	5,520	10,402	772,803
1934	439,172	158,482	49,560	59,330	28,439	69,905	21,398	47,271	9,642	9,115	3,758	12,418	6,900	10,999	926,389
1935	455,758	128,829	51,450	62,899	26,870	57,567	21,880	37,572	9,978	7,593	4,068	11,878	8,140	11,245	895,727
1936	475,359	—2,591	57,032	71,794	27,871	61,223	16,534	30,967	14,109	9,648	2,888	11,236	6,668	8,772	791,510
1937	592,394	92,707	59,871	98,170	36,088	62,311	24,733	28,904	19,164	14,970	4,343	4,680	2,400	13,063	1,063,798
1936:															
Nov.	37,897	—742	3,282	6,500	4,308	3,961	1,500*	2,162	964	1,090	445	1,388	200*	823	63,778
Dec.	50,838	—4,926	4,688	7,458	1,193	8,698	1,500*	3,426	1,184	759	276	1,206	200*	1,701	78,201
1937:															
Jan.	42,655	33	4,430	7,041	1,632	8,357	1,700	2,633	582	854	269	1,115	200*	567	72,068
Feb.	44,398	—222	5,296	7,911	1,271	6,630	1,502	3,048	304	1,363	245	452	200*	837	73,235
Mar.	39,888	343	5,347	7,668	2,612	6,935	2,119	3,598	1,293	1,641	371	709	200*	601	73,325
Apr.	42,066	3,808	5,291	8,664	1,343	5,837	1,669	1,532	1,058	1,069	362	1,070	200*	1,445	75,414
May	48,506	6,100	5,558	6,706	4,187	8,596	2,772	1,886	1,290	2,113	361	1,576	200*	925	90,776
June	48,972	5,157	6,010	6,469	3,791	7,608	1,958	3,940	2,226	1,630	521	1,802	200*	1,150	91,434
July	43,018	10,628	4,306	7,860	1,946	4,851	2,719	2,150	1,902	851	497	1,409	200*	753	83,090
Aug.	49,485	15,757	4,488	8,752	3,506	4,409	2,369	1,226	2,153	1,013	382	1,386	200*	1,692	97,018
Sept.	56,685	15,671	4,820	10,595	2,396	3,666	1,941	1,391	3,184	1,258	337	1,648	200*	1,369	105,161
Oct.	52,926	11,899	4,278	8,076	5,998	2,059	951	2,500*	2,470	967	367	1,535	200*	988	95,214
Nov.	54,135	12,878	4,311	8,848	4,787	1,368	2,857	2,500*	1,935	925	313	970	200*	846	96,873
Dec.	69,660	10,655	5,736	9,580	2,619	1,995	1,976	2,500*	767	1,286	318	1,008	200*	1,890	110,190
1938:															
Jan.	45,596	15,458	4,769	6,314	1,789	4,935	1,857	2,500*	574	1,257	300	1,239	200*	1,102	87,890
Feb.	40,977	16,505	5,456	6,959	615	3,173	2,053	2,500*	578	974	534	707	200*	1,771	83,002
Mar.	42,075	15,911	4,845	10,768			1,365	2,500*		761	342				

a—Including gutta percha. b—Including balata. c—Re-exports not deducted in monthly statistics. d—Including some scrap and reclaimed rubber. e—Official statistics of rubber imports by Soviet Russia. f—Including Norway, Sweden, Denmark and Finland. g—United Kingdom and French exports to Spain except in years prior to 1925. h—French imports have been reduced 12 per cent in order to eliminate imports of gutta percha and to reduce to basis of net weight. [1] United States imports of guayule are included in this compilation. * Figure is provisional; final figure will be shown when available.

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